

# The Chemical Age

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**NOTICES:**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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## Degrees in Technical Chemistry

WE learn with interest that a Technical Chemistry Department of the University of Edinburgh has been instituted to meet the needs of those students who desire definitely to prepare for the practice of chemistry in industry, and that the University now offers courses of training for degrees of B.Sc. and D.Sc. in technical chemistry. In this way the University is striking out in a new line in catering for the needs of potential works chemists, chemical engineers, and managers of chemical works. Up to the present the tendency has been too much for the chemist at a works to remain in his laboratory, when it would frequently be to his advantage and that of the efficiency of the works if he were able to take a fuller control of industrial processes logically in his sphere. The new scheme recognises this, and also the fact that the present methods of training chemists do not always produce the right type of man for industrial work, excellent as they are in training the potential research worker. The technical chemistry courses aim at providing:—

1. A sound instruction in the principles of chemistry.
2. A study of the methods of translating chemical processes from the laboratory to the works, with particular attention to the combustion of fuels.
3. Practice in such analyses as those of waters, oils, and fuels.
4. Laboratory practice in fundamental operations such as filtration, evaporation, crystallisation, drying, electrolysis,

furnace work, nitration, sulphonation, fusion, distillation, etc., with small scale works plant.

5. A sufficient acquaintance with the elements of engineering practice for the following purposes:—(a) To enable men to co-operate satisfactorily with an engineering staff concerned with the provision and working of large scale plant; (b) to make men more competent in handling large scale operations, the success of which is largely dependent on the best use of mechanical and electrical appliances; (c) to give facility in the interpretation of plans and drawings and sufficient skill in drawing for the execution of working drawings of simple plant parts and structures.

6. An acquaintance with methods of factory accounting with a view to a proper understanding of systems of costing.

7. An insight into methods of factory organisation.

8. When desired—and by special arrangement—detailed study of a particular chemical industry or group of industries.

It will be seen that the course is comprehensive and should serve its purpose well. It is understood that the training period for the degree of B.Sc. in technical chemistry will extend over four academic years. The Edinburgh experiment will be watched with interest by all concerned in chemical education and training, and its success may lead to important developments on similar lines elsewhere.

## France and the Haber Process

A GOOD deal of prominence has lately been given to the agreement between the French Government and the Badische Anilin und Soda Fabrik whereby the former acquire the technical secrets of and right of exploiting the Haber process. The Badische concern has come in for its share of criticism for this so-called "betrayal"; but the probable explanation is that privileges which were in danger of being insisted on by force by France, without any compensation, are now merely to be given up by mutual agreement, and at a price. Meanwhile, although the French Chamber of Deputies approved the agreement by a large majority some four or five weeks ago, it still awaits the approval of the Senate. It is too early, therefore, to say what the outcome will be; but, assuming that the Senate accepts the opinion of the Deputies, it would seem that before long France will be in a position to meet unaided by imports the greater proportion of her present demand for fixed nitrogen.

The actual position is clearly set out in an article by M. Maurice Deschiens in last week's issue of *Chemistry and Industry*. Apparently, in France to-day, the agricultural consumption alone has increased to 110,000 tons of combined nitrogen per annum, whereas the home production is no more than some 20,000 tons. So far as the Badische agreement and the projected works at Toulouse are concerned, it is contemplated that as a start an annual production of 36,000 tons would be aimed at, so that in total France would be in a position to supply about half of her agricultural requirements. With so many alternative methods

available for producing fixed nitrogen, the proposed agreement has led to decidedly lively discussion, and the array of competitive inventors all seem anxious to press and explain the merits of their own particular processes. The average spectator finds himself wondering why, when the Claude process is stated to present so many advantages over the Haber method, France should find it necessary, or profitable even, to concern herself with what is going on at Oppau and Merseburg? If what the specialists tell us is correct, the Claude process gives in the gas 25 per cent. of ammonia as compared with less than 6 per cent. in the Haber process. The yield of ammonia amounts to 6 grammes per hour per gramme of catalyst, as compared with 0.5 gramme with the Haber method, whereas Claude effects conversion in a single operation at 1,000 atmospheres instead of employing a complicated chain of operations at a pressure of 200 atmospheres, which has to be constantly maintained and restored at each step. Certainly, both in America and Germany there has been a notable tendency towards lowering pressure instead of increasing it as Claude has done; but even then the latter requires no more power than do the low pressure systems. One has not heard much lately about the full-size Claude unit at Montereau; but presumably it is still living up to its reputation. We must confess that the anxiety of France to conclude the agreement with the B.A.S.F. is by no means easy to understand, but one never knows nowadays to what extent politics may be influencing what would appear to be a purely technical and economic question.

### Chemist or Pharmacist

THE handsome double-column advertisement, headed "The Chemist," which appeared in so many dailies last week, under the authority of the Retail Pharmacists' Union, will by this time, it is to be hoped, have reassured the habitual medicine drinker that he can still take his favourite beverage with reasonable hope of not being poisoned. It also, even more certainly, exhibits the almost comic confusion which attends the use of the titles "chemist" and "pharmacist." For this statement of defence, written in so artful an imitation of Eighteenth Century English and set up so bewitchingly in old-face type, has nothing to do with the science of chemistry properly understood, but solely concerns the art of dispensing drugs.

The "chemists of Great Britain," in order to qualify for this benevolent office, have to undergo, one would gather, a course of preparation compared with which getting through the eye of a needle seems simple, and strange to say they undergo it, not at a college of chemistry, but at a "recognised and approved College of Pharmacy." Similarly, the 5,700 "chemists" who successfully dispensed thirty million prescriptions last year belong not necessarily to any chemical society or institute but to the Retail Pharmacists' Union. Yet contradictory as it is to have our good friends the apothecaries calling themselves chemists one moment and pharmacists the next, they are entitled to the former term; in fact, we believe, are alone legally entitled to it. For the Pharmacy Acts of 1859 and 1868 render it unlawful for any person to use the title "chemist and druggist" or "chemist" or "druggist" or "pharmacist" or "dispensing chemist or druggist"

unless he be a pharmaceutical chemist or chemist and druggist within the meaning of the Act, and is registered under the Act and conforms to such regulations as to the keeping, dispensing, and selling of poisons as may be prescribed by the Pharmaceutical Society with the consent of the Privy Council.

Now there is no great harm in all this; on the contrary, it is comforting to know that our poisons are in safe hands. But in what a curious position this British law places the great men who have really made the modern science of chemistry. Boyle, the "father" of the science, would, we suppose, be excluded. So presumably would be the great Phlogistians Black, Priestley, Cavendish, and Scheele. More recently the men associated with the laws of combination and the atomic theory—Dalton, Guy-Lussac, and Berzelius, for example—would have to be ruled out. Mendeléeff, Crookes, and Ramsay would share the same fate. Our contemporary leaders have no better claim. Sir William Pope may safely dispense poison gas for Germans, but might possibly be sued for selling a bottle across the counter, and his fellow professors likewise. The Presidents of the Institute, the Society of Chemical Industry, and the Chemical Society, in the eye of the law, become mere laymen. It seems a little preposterous that all these have no legal title to the term chemist, while the good friend who supplies us with our morning "pick-me-up" may safely so describe himself. So preposterous, indeed, that the pharmacist does not assert his rights against them, save in the sacred matter of selling poisons, and in many cases prefers his own true title. In time, no doubt, the confusion of terms will disappear. The "chemist" will be recognised as the man of science, and the "pharmacist" as that unfailing friend of mankind, who listens with equal urbanity to the woes of childhood, maturity, and old age, and in each case hands over the appropriate and usually quite harmless remedy, enclosed in white paper sealed with red wax, with the familiar assurance that it can be trusted to relieve the pain.

### Money from Ashes

WE have frequently had cause to remark upon the indifferent attitude which the industrial fuel consumer, whether large or small, displays towards the advice and instruction put at his disposal by official research associations and private individuals who have made a study of the subject. It would seem to be a thankless task to try to persuade the fuel-user of the importance of economy both from his own and from the national standpoint; and, difficult as it would be to apply and enforce, there is little doubt that the only effective deterrent against avoidable waste would be some form of legislation. Recently, however, quite a defined movement has been noticed on the part of consumers towards the recovery of the combustible matter always present in the ashes withdrawn from boilers, producers, and those industrial furnaces which utilise a solid fuel. This may, perhaps, look rather like approaching the problem from the wrong end, but fuel recovery from ashes is a most important phase of the whole question, and it is encouraging to find that some of our industrial engineers and chemists have discovered even one line upon which they consider it profitable to get to work.

It might be asked what scope for saving money does the recovery of combustible matter in this way afford? As an illustration that the scope is by no means limited it may be mentioned that the clinker removed from producers frequently contains up to 40 per cent. of material which is capable of being burned, while in ashes thrown out from the boiler-house the proportion more often than not approaches 20 per cent. Perhaps the real significance of these figures can best be appreciated by comparison with the amount of coal or other fuel originally used. For instance, in the case of producers the loss is equivalent to nearly 5 per cent. of the original fuel employed, and in the case of boilers it ranges from 2 to 3 per cent. In other words, it should be a comparatively simple matter, with cheaply-operated recovery methods, to save about a shilling on every ton of fuel consumed.

The recovery systems which are available to-day are operated on three distinct principles—namely, physical treatment, such as flotation; pyrogenous methods, by which is meant the conversion of the waste material into low-grade gas; and electrical methods such as magnetic separation. In this country we have mainly concerned ourselves up to the present with flotation methods, which, however, present the drawback of comparatively heavy expenditure on wear and tear. Undoubtedly, magnetic separation offers the most attractive proposition, provided electrical energy may be obtained moderately cheaply. In Germany the Krupp process seems to have reached a high stage of efficiency. It consists merely of feeding the whole of the ash upon the periphery of a revolving drum which is submitted to the action of a stationary magnetic field, the strength of which increases from the top of the drum downwards, and thereafter decreases to its least strength to the lower quadrant of the drum. Magnetic separation of combustible from incombustible matter depends upon the principle that all types of coal contain iron in the form of pyrites. The latter has no magnetic properties, but during combustion it is converted into oxides of iron which are magnetic, and as the whole of the iron passes away with the incombustible matter it is possible to separate this matter from the combustible constituents. Some of those who have had practical experience of the process might like to give our readers an opinion as to its efficacy as a fuel and money-saver.

### Judgment for the Therm

THE therm, which for some weeks past has been on its trial, has been found not guilty and acquitted without a stain on its character. The Departmental Committee appointed to inquire into the therm method of charging for gas have declared conclusively in favour of the system and recommended its application to all statutory gas undertakings. Measurement by the therm instead of by the cubic foot, they state, in no way affects the price, composition, quality, pressure or supply of gas, and they regard charging for gas on the basis of its heating properties as the best safeguard to the consumer. For the present, however, for the satisfaction of the consumer, it is recommended that meter cards and accounts should show the calorific value and the amount consumed both in therms and

cubic feet, though the committee point out that the volume basis alone gives no protection against the presence of inert or incombustible constituents, such as nitrogen, oxygen and carbon dioxide. What is likely to remove much of the present dissatisfaction is a system of testing all gas-fittings, etc., for which presumably qualified inspectors, as suggested by the Institute of Chemistry, would be required. The composition of gas has undoubtedly changed in recent years, and the "lighting back" which occurs for want of proper regulation of the burner arrangements is probably largely responsible for the consumer's suspicions. Admittedly, the condition of gas appliances is not perfect, and a reform here would do as much as anything to restore confidence.

### Points from Our News Pages

- In our China Clay Section Mr. A. B. Searle begins a series of articles on "The Chemistry of Colloidal China Clay." (p. 8).  
The first instalment is published of an article by Mr. Rex Furness on the possibilities of production of industrial alcohol from calcium carbide (p. 280).  
"Heat Transmission" was the subject for discussion at a conference of the Chemical Engineering Group last week (p. 282).  
Statistics relating to British chemical exports and imports during February are published from the new Board of Trade returns. (p. 286).  
A bright market, with a satisfactory turnover and a big export inquiry, is recorded in our London Market Report (p. 294).  
According to our Scottish Market Report prices of Continental materials are rising owing to possible future shortage of supplies (p. 297).

### Books Received

- GLUE AND GELATIN. By Jerome Alexander. New York: Chemical Catalog. Co. Inc. Pp. 236.  
THE ECONOMIC POLICIES OF RICHELIEU. By Franklin Charles Palm. Illinois: The University.  
THE DESTRUCTIVE DISTILLATION OF WOOD. By W. M. Bunbury. London: Benn Brothers, Ltd. Pp. 320. 35s.  
THE CHEMISTRY TANGLE UNRAVELLED. By Francis W. Gray. London: Longmans, Green and Co. Pp. 148. 6s.

### The Calendar

Mar.		
19	Chemical Industry Club: "Bolshevism and its Effects." Capt. N. A. Stilling. 8 p.m.	2, Whitehall Court, London.
21	Society of Glass Technology. 2.45 p.m.	The University, Birmingham.
22	Chemical Society: Annual General Meeting. 4 p.m.	Burlington House, London.
22	Society of Dyers and Colourists (Manchester Section): "The Regularity of Yarns." Dr. A. E. Oxley. 7 p.m.	36, George Street, Manchester.
23	West Cumberland Association of Chemists, Chemical and Metallurgical Engineers: "Mechanical Lubrication." A. James.	Workington.
23	Royal Institution of Great Britain: "Life History of an Alpha Particle from Radium." Sir E. Rutherford. 9 p.m.	Albemarle Street, Piccadilly, London.
24	Royal Institution of Great Britain: "Atomic Projectiles and their Properties." Sir Ernest Rutherford. 3 p.m.	Albemarle Street, Piccadilly, London.
27	Hull Chemical and Engineering Society: "Vat Dyestuffs." W. Thevenaz. 7.30 p.m.	Photographic Society's Rooms, Grey Street, Hull.



## Power Alcohol from Calcium Carbide.—I.

By Rex Furness

*The writer suggests that the production of extremely large quantities of power alcohol in England is possible, and he claims that if cheap electrical power became available, as, for example, by harnessing the tidal waters in the Severn estuary, alcohol could be manufactured at a price which would enable it to be put on the market in competition with petrol and benzol. Using calcium carbide as a source of alcohol, the process would draw to a relatively small extent upon the supplies of coal, while potential foodstuffs would not be employed. The conclusion of the article will be published next week.*

Two synthetic processes for the production of ethyl alcohol in quantity are available. The use of the ethylene contained in coal gas and coke oven gas for the formation of ethyl sulphuric acid, and the transformation of the latter into alcohol by hydrolysis, has been shown to be capable of realisation on a technical scale, although full details of cost are not available. This process will not, however, be considered here as it has been calculated that if all the ethylene in all the gas produced in England were converted into alcohol, about fifty million gallons of the latter could be produced per annum, taking as a basis of calculation the yields obtained in semi-large scale experiments at Skinningrove. It is abundantly clear, however, that all the smaller gas works and coke oven plants would not instal apparatus for the reactions involved in the production of alcohol from ethylene, as it would appear that the process is feasible only when large installations and close inter-working of the different sections of the whole gas or coke oven plant is practised. Deducting then, a large percentage from the estimate of fifty million gallons per annum, it becomes obvious that this process cannot serve to supply an alternative or competitive fuel to petrol, although useful amounts could undoubtedly be obtained.\* It is with the potentialities of the process by which alcohol is synthesised from calcium carbide as a starting material that this article is mainly concerned.

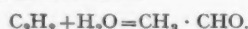
It may be said at once that the process is quite impossible of technical application in England under present conditions, but if one condition, not by any means impossible but rather the reverse, be fulfilled, namely, the development of electrical power at a very cheap rate, then the cycle of operations from carbide through acetylene and acetaldehyde to alcohol can be carried out on as large a scale as desired, and the cost of the final product can be brought sufficiently low to render its use as an internal combustion engine fuel economically possible.

On the question of the actual production of power in hydro-electric installations at, let us say, 0.1d. per unit, the writer will not dwell. Our resources in these islands in this respect are small compared with many other countries, but the possibilities of such schemes as the utilisation of the tidal waters in the Severn estuary are enormous. The practicability of the Severn scheme has recently been vouched for, and the amount of energy which can be rendered available is very great. There is, in addition, substantial justification for assuming that electrical power will be made available in England at a price of 0.1d. per unit.

The three stages of the synthesis of alcohol are as follows. Calcium carbide is converted to acetylene, with the simultaneous formation of a "waste lime sludge," according to the following equation,



The acetylene is transformed into acetaldehyde by catalytic hydration in the presence of a suitable catalyst, say, mercuric oxide in sulphuric acid solution.



Finally, by catalytic hydrogenation over reduced nickel or copper (Sabatier and Senderens), or by electrolytic hydrogenation the aldehyde is converted into ethyl alcohol.



The reactions are all capable of realisation on a large scale, and although there is no doubt that improvements can be effected, particularly in the last reaction, yields are in each case good. Assuming that a yield of 80 per cent. of purified acetylene can be obtained from calcium carbide, that the

conversion of acetylene into acetaldehyde can be effected with a yield of 90 per cent. of the theoretical, and that a similar yield can be obtained in the hydrogenation of the aldehyde, an over-all yield of almost 65 per cent. of alcohol from calcium carbide would result. This means that the production of a ton of 100 per cent. alcohol entails the consumption of about 2.13 tons of ordinary calcium carbide. As regards hydrogen consumption in the last step of the process, it is calculated that about 20,000 cubic feet would be required per ton of alcohol produced, allowing for the 90 per cent. yield in this stage, but with no allowance for losses in circulation. Taking the cost of carbide at £6 10s. per ton and that of hydrogen at 2s. per thousand cubic feet (which figures will be justified more fully later), the total cost of these two basic raw materials would be £15 16s. per ton of alcohol produced. Calculating 275 gallons of approximately 100 per cent. alcohol to the ton, the latter cost figure represents 1.15 shillings per gallon of product. Other materials than calcium carbide and hydrogen are required in small quantity only, as, for example, mercuric oxide, sulphuric acid, etc., in the catalytic production of aldehyde, but the charges upon the process are small in comparison.

### An Outlet for Coke

Before passing to the individual treatment of the stages in the synthesis of alcohol, and to a fuller discussion of manufacturing costs, it may be well to review the advantages which would accrue from the application of this process for the production of a petrol substitute.

The raw materials are available in such quantity as to ensure that the diversion of the amounts required for the alcohol process would have no appreciable effects in other directions, say by curtailing supplies to other industries. For the production of 275 million gallons of alcohol per annum, it has already been calculated that 2.13 million tons of calcium carbide would be required. The manufacture of this amount of carbide would consume about 1.4 million tons of 90 per cent. coke. Thus, although it is true that one of our exhaustible resources would have to be drawn upon, in contradistinction to the annual replacement of crops of starch and sugar containing materials which are utilised in the fermentation process, the demand upon these natural resources is inappreciable in comparison with the total quantity consumed in this country.

### Alcohol from Calcium Carbide

It is of interest here to record that a German Government Report, published in 1918, states that the Swiss Government contracted for the supply of alcohol at a cost of 1s. per gallon, with the Elektrizitätswerke, Lonza. The alcohol was produced at Lonza for some time, but it is believed that manufacturing operations have ceased, at any rate, temporarily. Incidentally, the remark is made in the German Report that it is more economical to utilise calcium carbide as a raw material for the production of cyanamide fertiliser, and apply this to potato production, than to use the carbide as starting material in a synthetic process such as is under consideration. The increase in the yield of potatoes corresponds to a quantity of alcohol (obtained by fermentation) amounting to four times that which could be produced synthetically. The figure of 1s. per gall., however, seems unnecessarily low in view of the price paid by the Swiss Government elsewhere. Again, although electrical power is cheap in Switzerland, the coke and lime required for the production of carbide are only obtainable at a much higher figure than in this country.

It is significant that synthetic acetic acid (the manufacture of which proceeds along the same line as the synthetic alcohol process) can be produced in Canada at £40 per ton. When it is realised that raw materials are dearer in Canada than here, and the oxidation of acetaldehyde to acetic acid is a difficult, dangerous and costly operation, by reason of the corrosive

\* If the distillation of "Trent" coal-oil-amalgams to produce a gas with a high ethylene content be brought into general use, the relatively high yield of alcohol per ton of coal carbonised would possibly alter the economic basis of process of producing alcohol from ethylene.



action of the acid-aldehyde mixture, it would appear that the chances are favourable for the production of alcohol at less than £40 per ton, or 2s. 10d. per gallon, approximately.

#### Calcium Carbide

Space does not permit the inclusion here of a description of the latest types of electrical furnaces which can produce 50 to 100 tons of calcium carbide per hour. The furnaces constructed with all modern improvements have continuous mechanical feeding means, and the carbon monoxide liberated during the process can be cleansed and utilised. The six electrodes on a single hearth are likely to give minimum trouble nowadays, and replacement difficulties and costs are almost negligible. Carbide could be produced in Norway before the war at a cost of under £8 per ton, although lime and coke or anthracite were obtainable only at a high figure. The cost of electrical power in pre-war days was (according to Hagemann, Consulting Engineer to the Nitrogen Industries, Christiania) not more than £2 per kilowatt year, on an average, and as low as £1 4s. per kilowatt year in certain cases. The lowest figure means 0.04d. per kilowatt hour and the cost of power per ton of carbide produced only 14s.

The following figures showing the cost of production of carbide are higher than those given by the Nitrogen Products Committee, 1919, and should represent a fair estimate if the carbide is prepared in large quantities in the newest furnaces, and with the employment of labour-saving devices; 4,150 to 4,250 units of electricity are required for the production of one ton of carbide, this figure covering power used in the furnaces, that lost in transformers and leads, and also including the relatively smaller amounts used for driving motors, crushers, elevators, pumps, etc.

The items may be divided as follows, the figures being in shillings per ton of carbide produced.

Lime, .8 ton .....	} 50 at 35s. per ton
Coke or anthracite, .625 ton.....	
Electrical power, at .1d. per unit ..	35
Electrodes .....	0.5
Labour and repairs .....	30
General charges .....	15
Total .....	130.5 shillings

The figure representing labour and repairs is lower than is shown by some producers, but is on the high side in the writer's opinion, if a large output is under consideration.

It may be possible to evolve some method of reusing the lime obtained in the acetylene generation. Admittedly it is ordinarily a nuisance, but if carefully selected lime be used in the process of carbide manufacture, the lime sludge left after the development of acetylene should be capable of drying in a rotary kiln, and should be capable of transformation into a condition rendering its reuse feasible. This would overcome a double difficulty, namely, the disposal of the lime sludge, and the unnecessary transport of new lime to the factory.

#### Hydrogen

The electrolytic method for the production of hydrogen is quite impossible of economic realisation except in localities where cheap power is available. The "iron-steam" and the water gas "contact" processes represent much cheaper methods of large scale production. Assuming, however, that power becomes available at 0.1d. per unit, the whole conception of the problem is changed. The production costs of the purest form of technical hydrogen fall far below those of any other process, even if no allowance be made for the oxygen simultaneously obtained.

It is not proposed to survey here the numerous varieties of electrolytic cells which have been described in recent years, but it may be stated that several extremely efficient models, both of the "filter press" type and the "tank" type, are in successful operation. A solution of caustic soda or potash, or of sulphuric acid, is electrolysed, care being taken to maintain a rigid separation of the two evolved gases, to ensure constant concentration and temperature of the electrolyte, and to prevent foaming. As the resistance of the cell increases with the distance apart of the electrodes, it is arranged that the latter shall be as close as is possible, regard being had to the necessity of preventing absolutely the danger arising from mixing of the hydrogen and oxygen produced. On account of the "back" E.M.F., due to polarisation, it is known that the

minimum voltage required for electrolysis of dilute caustic soda solution is about 1.69.

Now, it is easily calculated from Faraday's Laws of Electrolysis that one ampere in one hour will cause the evolution of .0147 cubic foot of hydrogen, measured at N.T.P. But, as noted above, current must be supplied to a caustic soda electrolyte at 1.69 volts. Thus, 1.69 watt hours lead to the evolution of .0147 cubic foot of hydrogen, or 1,000 watt hours, that is one kilowatt hour, will liberate 8.7 cubic feet hydrogen.

In actual practice, of course, these theoretical figures are not attained, and it is found that in the "filter press" type of electrolytic cell, about 5.9 cubic feet of hydrogen and about half that amount of oxygen are produced per kilowatt hour. Similarly, in the "tank" type of apparatus, almost identical results may be obtained, but it is generally conceded that the purity of the gases is higher. The former kind of electrolytic apparatus, however, possesses advantages in the direction of compactness and ease of manipulation. Hence, taking a production figure of 5.9 cubic feet of hydrogen per unit of electricity expended, it is clear that about 170 units of current are required for the production of 1,000 cubic feet of hydrogen, and about 500 cubic feet of oxygen, measured at N.T.P. Newer American cells are claimed to be producing 1,000 cubic feet of hydrogen with the expenditure of 135-140 k.w.h. With power at 0.1d. per unit, the total power cost for these quantities of gases will amount to 1s. 5d. Thus, without going into details as to the cost of labour, chemicals, upkeep, and general expenses, which are light in comparison with power costs, and remembering that the oxygen produced simultaneously with the hydrogen commands a ready sale,\* it is considered that the estimate of the cost of hydrogen, 2s. per 1,000 cubic feet, already indicated, errs, if at all, on the high side.

A repetition of the fact may be allowed here that, assuming the possibility of cheap power, and hence the manufacture of the basic raw materials for alcohol synthesis, at the above costs, power spirit could be manufactured in England for 2s. 2d. per gallon at the factory, if working expenses, plus profit, could be reduced to 1s. 1d. per gallon, an equal sum being necessarily expended upon raw materials.

#### Emulsoids and Chemical Reactions

DR. J. NEWTON FRIEND (Chemistry Department, Birmingham Municipal Technical School) spoke upon "The Influence of Emulsoids upon the Velocity of Chemical Reactions" at a meeting of the Birmingham and Midland Section of the Society of Chemical Industry at the Birmingham University on Tuesday, March 6. Dr. E. B. Maxted presided.

The author pointed out that an emulsion is a system of two liquid phases, the first of which is continuous, the other discontinuous, or disperse. If the disperse phase consists of very minute particles of diameter, say, one-millionth to one ten-thousandth of a millimetre, the system is termed emulsoid. Emulsoids may be prepared directly by adding a suitable continuous phase to a gel and then warming up.

Freundlich's adsorption law was explained, and it was pointed out that it was really a special case of the better known partition law. It was shown that the retardation of the corrosion of metals by emulsoids obeys the adsorption law. The rates of solution of salts in water and the rates of crystallisation of salts from aqueous solution are similarly retarded. The characteristic feature of emulsoids was their power of being adsorbed; and illustrations were given showing the influence of emulsoids on the course of some familiar chemical reactions. For example, plates of iron, lead and aluminium were shown corroding in salt solutions in the absence and in the presence of traces of emulsoids. The metals in the solutions containing the emulsoid had hardly been affected, whilst the others had been heavily attacked. Since in domestic cookery colloids were invariably present, it was easy to understand why the vessels did not corrode so rapidly as might be expected. Whilst emulsoids and gels generally retarded chemical action, one interesting case was given in which the gels acted as catalysts, namely, in accelerating the setting of linseed oil.

\*It may not be justifiable here to pay any regard to this factor, but it should be remembered that the applications of cheap oxygen in metallurgy, coal gas production and other industries are being increasingly studied, and the future demand for this gas will be enormous.

# Chemical Engineering Conference on "Heat Transference"

## Some General Impressions: By "C.A."

THE informal conference of the Chemical Engineering Group of the Society of Chemical Industry, held at the Chemical Industry Club, on Monday, was again well attended, and it is now abundantly clear that these meetings are appealing to wide sections of chemical engineers, technical chemists, and others in allied professions, and that a much-felt want is being satisfied. The subject of the conference was a paper on "Heat Transference," by Mr. B. Heastie, A.M.I.C.E., Mr. J. A. Reavell, chairman of the Group, presided.

It will be appreciated by those who have knowledge of this subject that it does not lend itself to facile treatment or ready exposition, because equations and formulæ must frequently arise in the treatment of the subject, and it requires a professor, or some such superman, to impart a captivating interest to these somewhat prosaic terms of expression. Unfortunately, a refractory lantern—refractory, not in the sense of heat resisting, but of heat promoting, by reason of its sheer perversity—did not assist the lecturer, who was also placed at a disadvantage by reason of the inadequacy of the general accommodation. The apology for these disabilities, which Professor Hinchley so graciously expressed to the lecturer, was sympathetically shared by all those present.

Much as the generosity of the Chemical Industry Club in the matter of the loan of the room is appreciated, it is obvious to all that the several societies coming within the purview of the chemical industry should be able to justify more pretentious and commodious premises than are at present available, where a suitable room (adequately equipped for lectures and papers of the character under review), could be provided, and where the congenial atmosphere of the club would obtain. It is hoped that this imperative need will be met very shortly.

"Heat transference," like "leaching," is a subject with extensive ramifications, and no single conference could hope to exhaust all that is to be said in this connection. The paper by Mr. Heastie served as a useful introductory study. For too long now has the design of heat transfer apparatus, such as steam boilers (tubular and otherwise), coolers, condensers, evaporators, dephlegmators, interchange heaters, and a variety of similar plant, been based on established practice, for which there was no real foundation except that of empiricism engendered by the difficulties inherent in the subject. It is high time that such established practice should be tempered and shaped by the consideration of scientific knowledge and data which have been accumulated as the result of careful scientific determination.

Plants erected during the war by many firms outside the sphere of the Ministry of Munitions were badly designed from the point of view of heat transfer. Oleum mixers and coolers were erected which were inefficient and unsatisfactory; benzol rectifying plants were installed, in connection with which no adequate idea could be afforded as to the steam and water consumption, both of which could have been materially minimised, had the designers appreciated such factors as viscosity, stream line flow, turbulent motion, and specific velocity. Dephlegmators and condensers, in connection with liquor ammonia plants, were put into commission, of an unsuitable type, where the transfer of heat was not aided in any appreciable degree by the creation of turbulent motion; evaporators had to be used for the concentration and evaporation of solutions which were not satisfactory for the purpose for which they were specifically designed.

It is not suggested that all these delinquencies were due to "established practice," but it is submitted that a greater appreciation of the laws governing heat transference, and the application of known formulæ in this connection, would have prevented many pitfalls. In the past Housbrand and Jordan have been the authorities to whom chemical engineers have resorted for formulæ as affecting heat transference, but at the moment there is a distinct need for a treatise which would eliminate many of the unnecessary data afforded by Housbrand, particularly where safety factors are contemplated. Any such treatise should aim at simplification of the formulæ

on the lines indicated by Professor Hinchley in his discussion of the paper in question. Formulæ embracing hybrid units should be eradicated.

All reciprocals of conductivity should, as far as possible, be expressed in one term, and should not appear as expressions of resistivity in three terms. C.G.S. should be replaced by M.K.H. (metres, kilograms, hours), which will give a unit likely to be better conceived and appreciated. The metric system should be definitely adopted in connection with all heat transfer formulæ.

Alignment charts were the subject of some criticism which, to a large extent, was well founded, but no one need deprecate the use of alignment charts where such charts have been prepared by the actual user. Where there is ground for criticism is in the use of alignment charts prepared by some person other than the user. Logarithmic mean is to be preferred to arithmetic mean, and this is important when plotting curves having reference to heat transfer.

Heat transfer formulæ arise in connection with a variety of plant which has been adopted recently. Many chemical operations susceptible to decomposition are now effected in vessels where the transmitted heat is derived *via* a molten metal or alloy, contained in a jacket. This method of heating has been adopted by reason of the equable and determinable temperature which can be maintained. But few had appreciated, until Mr. Swindin intimated in the course of the discussion, how high was the coefficient of heat transfer in connection with this method of heating. A figure of over two hundred was given as representing the heat coefficient when expressed in terms of kilogram calories per square metre per hour, per degree Centigrade temperature difference, whereas figures of sixty or seventy were common in connection with a similar type of vessel, without the molten metal jacket, where direct heat was applied. Mr. Heastie's paper, in print, will be anxiously awaited.

## Summary of the Paper

In his paper on "Heat Transmission" Mr. Heastie started by pointing out that among the many problems which confront the chemical engineer, that of the exchange of heat between gases or liquids in coolers, heaters and condensers, is a common one. Furthermore, the amount of reliable data available was extremely small. The paper gave a review of our present incomplete knowledge of the laws governing heat transfer, and started by mentioning the three ways in which the flow of heat may be caused, *viz.*, by conduction, convection, and radiation.

Mr. Heastie first considered the transfer of heat from saturated steam to a liquid through a metallic plate. Three resistances would be met, the condensed steam on the face of the plate, the metal plate, and a stationary film of water on the other face of the plate. It was pointed out that the total temperature drop was chiefly due to the resistance of the two films, whilst the drop across the metal plate was often negligible in practice.

When a liquid or gas is in contact with a solid, such as the dividing walls of a tube, a relatively stationary film of liquid adheres to the face of the solid, a film which becomes thicker as the velocity of the fluid parallel to the surface increases, but which breaks away from the solid only at the highest velocities, if at all. It should be noted that the thickness of the film depends upon the viscosity of the liquid. Through this film heat could only be transmitted by conduction. Since most gases and liquids are very poor conductors of heat, there was usually a very great resistance to heat flow at the boundary surface of a liquid or gas and a solid, accompanied by a large temperature drop at this point. A further resistance often met with in practice was a film or layer of solid matter due to deposits from the liquid or gas, and this might have the effect of increasing the resistance of the solid to heat flow by one hundred fold. When dealing with viscous liquids, the film resistances were often so high that a certain amount of scaling did not affect the transmission to the extent



that might be expected. Thus in 1921, Frost and Manley found that the heat transmission in 2 in. standard steel pipe was reduced 25 per cent. in two months' use.

#### Practical Determination of Conductivity

In order to obtain an overall figure for this co-efficient, it was necessary to consider each film separately. Thus in the first case, steam to liquid, three resistances were met with, viz., the condensed water film; the wall of the tube; and the liquor film. The most reliable formula for the co-efficient of heat transfer from vapour to a metal wall was probably the McAdams and Frost formula:  $h = 260,000 K/n$ , where  $K$  is the thermal conductivity in c.g.s. units and  $n$  the absolute viscosity in c.g.s. units. In this equation for heat transfer, no account is taken of the velocity of flow.

A number of other formulae were mentioned which had been tested by the lecturer. The practical difficulties in the way of obtaining satisfactory measurements of the temperature drop and the thickness of the films were very great, and a few slides were shown indicating the methods used to secure this information. Reference was also made to the use of alignment graphs in obtaining comparative results with some of the more complex formulae. It was pointed out also that different liquids and gases on opposite sides of the metal produced very different conductivities and reference was made to the influence of air in steam used for heating. The latent heat in saturated steam was an important factor in heaters, and in connection with super-heated steam, it was generally known amongst engineers that the heat transfer between a gas and metal was very slow, but this fact was often overlooked in practice, and in some cases within the author's experience highly superheated steam had been supplied to heaters with the object of increasing the work done. An interesting case occurred recently where two heaters were installed, the liquid passing through them in series. Each heater was connected to a supply of exhaust steam, and as a higher final temperature was required, live steam at 20 to 30 lbs. per sq. in. was supplied to one of the heaters, with the result that the final temperature dropped. Upon investigation it was found that the steam was superheated to a total temperature of 200 deg. C., and experience had proved that it was a fallacy to use superheated steam for heating or evaporation.

#### Turbulent Flow

It was well known that when the velocity of a liquid passing through a tube is quite small, the flow is smooth, or viscous, and the conductivity was very small, and it had been shewn by Osborne Reynolds by experiments on cylindrical tubes that in such tubes turbulent flow does not take place until the velocity reaches a certain critical value which is dependent upon the viscosity and density of the fluid, and also upon the diameter of the pipe. In all the heat transfer equations, turbulent flow was assumed. It was also mentioned that the rate of flow of water through a steel or iron pipe has a great effect upon corrosion. Dr. Newton Friend in some recent experiments, had shewn that when water flowed with a velocity lower than the critical, corrosion takes place rapidly, whilst when the flow was turbulent, the corrosion was very greatly reduced.

For rapid heating or cooling, one of the chief factors was the velocity of the liquid, and the author shewed an illustration of a type of heat exchanger which, whilst costly to manufacture, had been proved to have an extremely high efficiency. The paper then dealt with the question of heating up the contents of a tank by circulating the liquid through an external heater, which is heated by steam.

#### Points in the Discussion

In the discussion which followed, Professor J. W. Hinchley, in congratulating the author on the paper, referred to the need for simplification in formulae relating to heat problems, especially in the substitution of resistivity for conductivity, and also expressed the hope that metric units only would be used and not a mixture of metric and British units, as the author had done in the paper. He also criticised the accuracy of alignment graphs for calculation of experimental results. The Americans were ahead of us in a number of ways, especially from the point of view of putting their problems forward in a simple manner. That was, perhaps, because the Americans

took so many things for granted which British workers would not, and he could not help saying that he found some of the American formulae singularly ineffective. At the same time, he did not wish to belittle the work the Americans had done, which was valuable pioneer work. Nevertheless, he believed that chemical engineers in this country would be able to improve the American formulae when they once started in real earnest on these problems.

Mr. E. Parrish said it would have been useful to have had some practical applications of the formulae in the paper. He felt that chemical engineers should set to work to devise some means for overcoming the difficulty introduced by the film, and in some respects this had already been done. The great improvement in the later forms of Bonecourt boiler was due to the straight line flow difficulty having been overcome through the introduction of turbulence, and turbulence had also been found to have an important effect in other classes of apparatus. For instance, in condensers at coke oven plants. It had been found that with turbulent motion at right angles to the tubes, the size of the condenser could be reduced considerably as compared with plant in which the gases flowed parallel to the tubes.

Mr. N. Swindin agreed with Professor Hinchley as to the complicated nature of many formulae and mentioned simple formulae which he had devised for straight line and turbulent flow respectively. Another feature of all the formulae mentioned in the paper was that no allowance was made for the rate of flow laterally along the tube, and pointed out that, for instance, it was possible to get more heat through a very thick walled tube than through a thin walled tube, and that it had been found possible to get more heat through a tube 3 ft. long than from one 16 ft. long.

The Chairman said there was one point which neither the author nor anyone else had touched upon, but which was probably very important, and that was in connection with air or non-condensable vapours in the heating steam, but there had been very little work done on the question, for instance, as to what part of the vessel one had to look for the air. He believed that in an evaporator it had been shown that there is a curious patch or patches where no work was being done owing to the existence of a cloud of non-condensable vapour passing.

The Author, in the course of a short reply, said he thought the improved efficiency of the Bonecourt boiler was due to radiant heat in the tubes and not to turbulent flow.

#### The Phildes Product Co.

MR. ROBERT HASLAM JACKSON, 3, Essex Court, Temple, E.C., lately carrying on business as a chemical merchant, attended before Mr. Registrar Francke at the London Bankruptcy Court on Friday, March 9, for his public examination on a statement of affairs showing liabilities £2,358 and an estimated surplus in assets of £8,364. In October, 1920, the debtor began business at 19, Devereux Court, Strand, under the style of the Phildes Product Co. That was a merchant's business principally concerned with chemicals. He possessed a capital of £600 at that time, and in June last he transferred the business to a company which was then formed with a capital of £1,000 divided into shares of £1 each. As consideration he was allotted 450 shares as fully paid, and he was appointed director, acting in that capacity until August. The debtor denied insolvency and attributed his present position to litigation and other causes. The examination was concluded.

#### "The Problem of Solution"

THE articles on this subject which recently appeared in THE CHEMICAL AGE from "Dr. B. Lagueur" (now openly introduced as Dr. Stephen Miall) have been republished as a pamphlet (Benn Brothers, Ltd., pp. 33, 2s.). The conversations in which some modern theories of solution are discussed in a breezy but really illuminating form by "a Chymist, a Farmer, a Brewer, and his Friend," are rather fuller than as originally published, and in addition to contributions from "A Spagirist," Professor Findlay, and Professor Lowey, we have now an appropriate introductory note by Professor H. E. Armstrong. Altogether an entertaining booklet, with much good humour, some very clever literary sword-play, and not a little stimulating suggestion on chemical theory.



## The Ruhr and British Dyes

To the Editor of THE CHEMICAL AGE.

SIR,—A week or two ago you were good enough to publish a letter of mine in which I ventured to draw the attention of the commercial community to one aspect of the occupation of the Ruhr. I pointed out that, but for the Dyestuffs Act that had made possible an industry on which £200,000,000 worth of our country's trade depends, this crisis would certainly have created a crisis in British factories.

Since then there has been in many quarters, and from critics both lay and political of British dyes, an appreciation of their present significance as generous as it has been widespread. Dr. Herbert Levinstein has given the weight of his unique authority to a public testimony to the present achievements of our dyestuffs workers; the President of the Board of Trade has told us how some of them have been working the round of the clock to supply the demands of colour users. Is it too much to ask the business men to see to it that our dyestuffs policy shall be regarded in the immediate future, as, indeed, it was in its inception, from this strictly non-party aspect? Believe me, yours very truly,

N. GRATTAN DOYLE.

House of Commons, S.W.1.

March 13, 1923.

## "Colloid Chemistry"

To the Editor of THE CHEMICAL AGE.

SIR,—With the assistance of prominent specialists the world over, I am preparing a comprehensive book on "Colloid Chemistry, Theoretical and Applied." The extensive and international character of the book is evidenced by the subjoined list of some of those who have already promised contributions:—

U.S.A.—E. G. Acheson, W. D. Bancroft, Carl Barus, M. H. Fischer, W. D. Harkins, H. N. Holmes, G. A. Hulet, D. D. Jackson, F. G. Kunz, R. S. Lillie, D. T. MacDougall, S. E. Sheppard, A. Silverman, E. B. Spear, E. W. Washburn, A. W. Thomas, H. A. Gardner.

ENGLAND.—E. F. Armstrong, Henry Bassett, W. M. Bayliss, E. F. Burton, W. B. Hardy, F. G. Donnan, F. E. Lloyd, A. E. Dunstan.

GERMANY.—H. Bechhold, G. Bredig, A. Fodor, H. Handovsky, A. Lottermoser, Lüppo-Cramer, R. Höber, W. Ostwald, H. Plauson, E. Stiasny, G. Tammann, H. Schade.

AUSTRIA.—C. Doelter, W. Pauli.

JUGOSLAVIA.—M. Samec.

SWEDEN.—Sven Odén.

HOLLAND.—H. R. Kruyt.

MEXICO.—A. L. Herrera.

Many unusual experimental facts and practical applications of colloid chemical principles are unpublished, and the object of this letter is to ask anyone in any field of science or experience, who may have information of interest, to send me a brief statement for inclusion in the book. Contributions may consist of a paragraph, a page, or several pages, and will (unless contrary request is made) be duly acknowledged. If possible, they should be submitted in English and duplicate copies will be appreciated. Authors should state their full names and titles.—Yours, etc.,

JEROME ALEXANDER.

50, East 41st Street, New York.

## The Butters Nitrate Process

To the Editor of THE CHEMICAL AGE.

SIR,—In your issue of January 27 is published an article on "The Butters Nitrate Process," in which reference is made to the "filtration of the pulp in Butters pressure filters." Being the inventor of the filter in question and holding British patents, I beg to state that you have been misinformed regarding the name of the filter, for it is known as the "Burt Revolving Filter," and Chas. Butters and Co. are licensed to sell the filter in the nitrate fields of Chile. The filter is used in the cyanide process in Mexico and the United States, also in the zinc and lead process.—Yours, etc.,

EDWIN BURT.

Canutillo, Texas, U.S.A.

February 16, 1923.

## The Valuation of Dyestuffs by Titration

Development of a Rapid Method

At a meeting of the Society of Dyers and Colourists, held at the Dyers' Hall, Dowgate Hill, London, on Thursday, March 8, a paper on "The Valuation of Dyestuffs by Titration Methods" was delivered by Mr. R. B. Brown and Mr. Harold Jordan, describing the rapid valuation of a number of commercial dyestuffs carried out by the authors with titration methods based on the mutual precipitation of acid and basic colouring matters. The authors were concerned to devise a method which could be carried out more rapidly than the usual dyeing tests, and would yet afford a sufficiently exact indication of the colour value. For several of the more widely used dyestuffs, which are offered in many brands of varying strength, they had worked out titration methods allowing of an estimation of difference of 2-2½ per cent., a nearer valuation than was possible by any dyeing or staining test.

The principles laid down by the authors were: (1) The dyestuff to be estimated, and the volumetric reagent selected, must be of quite different colour in solution, e.g., blue with red, green or blue with yellow; (2) the acid colour should be run into the solution of the basic dyestuff (the reverse method was seldom useful); and (3) in determining the end point a quick judgment must be formed. The strength of the dyestuff solutions employed was 1 gm. in 500 cc., and the end point was recognised by the appearance in a spot made on filter paper of a ring of the colour of the precipitant solution.

Useful methods of valuation included the following: Auramine, by direct titration with Indigo Carmine; Methyl Violet, with Naphthol Yellow S; and Victoria Blue B, with Tartrazine. In the case of most other basic dyestuffs, titration with an acid colour alone did not give a definite end point. In several cases a useful modification was titration with a solution containing tannic acid and sodium acetate in addition to the acid colour, e.g., Brilliant Green and Malachite Green were titrated with a solution containing 1 gm. Orange II, 2 grms. tannic acid, and 2½ grms. sodium acetate per litre.

With regard to acid colours the process was the same, the volume of solution of acid dyestuff required to precipitate a given weight of basic colour being an index of the colour strength. Up to the present trustworthy valuations were only possible in the case of Orange I, Orange II, Tartrazine, and Naphthol Yellow S, and for all these dyestuffs the reacting basic colour was Victoria Blue or Night Blue. Eosine could be estimated by running a solution of the dyestuff into a Malachite Green solution. With direct cotton colours, said the authors, much less progress had been made. It was found that concordant results were only obtainable by working within certain limits of concentration; if it were desired to value products which were very much stronger or weaker than the standard taken for comparison, it was well to prepare a solution approximating to the usual colour strength.

Another question which naturally arose was the effect of slight differences in the shade, and therefore in the constitution of the products tested, on the result of titration; such effects could only be investigated with precision with purified dyestuffs.

In reply to a number of questions, Mr. Brown said he believed the method was only useful for testing dyestuffs which were fairly near together in shade.

Replying to Mr. F. W. Walker (hon. secretary), Mr. Jordan said that in connection with brightness, particularly with regard to Rhodamine, it was not claimed that it was possible to detect anything like that by this method. The method was simply to give an estimation of the strength of two samples, and in the case of Rhodamine one would make further dyeings or stains. It was always preferable to titrate Benzo in a hot solution when using Victoria Blue, but with Auramine they simply worked at the ordinary laboratory temperature, and had got fairly reliable results so far. With regard to Victoria Blue bronzing, they always used a little acetic acid with Victoria Blue, and had not had trouble with it.

Replying to other questions, Mr. Jordan said he had never had occasion to question the results of either hot or cold titration until he had come to work with direct colours. In that case he was not getting consistent results when working in the cold, but with hot solutions his results were quite consistent. The Lovibond Tintometer gave a very useful record of the colour of the solution and showed impurities, but was not nearly so useful for showing relative strengths.

## Oil and Colour Chemists

### Discussion on "Viscometry and Plastimetry"

AT the meeting of the Oil and Colour Chemists Association on Thursday, March 8, the paper read by Mr. A. E. de Waele at the February meeting on "Viscometry and Plastimetry" was further discussed.

Mr. E. MARDLES referred to the difficulty of obtaining simple standards for the calibration of viscometers for varnish work, and said that in the absence of suitable standards it was possible to use a chain of viscometers with increasing times of flow in conjunction with a variety of liquids of different viscosities, using water as a standard. He had used this method in determining the viscosities of cellulose acetate varnishes and had found the value in absolute units to agree quite well with the viscosity determined by the falling sphere viscometer.

Mr. DE WAELE said the idea of determining viscosity by means of a chain of viscometers was quite new to him and it would certainly be of value in checking standards.

Dr. E. FYLEMAN described experiences with phenomena encountered in the squirting of tungsten lamp filaments.

Dr. MARTIN said his interest was in Portland cement manufacture and there were several points of relationship between that industry and paint. His chief interest was the viscosity of the cement slurry. There was usually 40 per cent. of water in the slurry, and the important thing is to reduce this as the evaporation of it necessarily meant the use of coal. It had been found that the addition of a trace of alkali to the slurry would often take away 10 per cent. of the water which meant a big reduction in the coal bill. The reason was not known but the stuff must be fairly thin, otherwise the pumps would not take it. Another matter in the cement industry concerning which there was yet a lot of work to be done was the use of coal dust for the furnaces. This was conveyed through pipes just as a fluid was, and was contained in large bins. So like a liquid was the coal dust in these bins, that if a man fell into one he was "drowned." The same laws would probably hold good in the case of this coal dust as with a liquid. The slightest trace of moisture in the coal dust would increase the viscosity enormously so that the coal ceased to flow. Reduce the moisture by about  $\frac{1}{2}$  per cent. and the flowing began again.

Mr. A. E. BAWTREE was frankly pessimistic as to the value of the methods indicated in the paper. The author suggested a too advanced type of research for practical purposes, and he preferred methods which were less scientific and of a more practical nature. Reference was made to a new form of bubble test, devised by Mr. Bawtree and also to the Bawtree viscometer.

Mr. LONSDALE asked if Mr. de Waele had made any experiments on vaseline after the manner of those made by Professor Trouton in 1904 to 1906 on pitch. Professor Trouton found that if a small shear was applied to pitch, there was a sort of elastic strain energy stored up in the material, and when the force which produced that shear was taken away, there was a relaxation back to the original position of equilibrium. It seemed to him that if we could regard vaseline as being composed of a number of plastic crystals more or less interlocked in a viscous medium, it might be possible to get an indication of an effect of the same nature, and it would be interesting to know whether Mr. de Waele had made any experiments as to the temperature at which that effect first manifested itself.

Mr. DE WAELE, in his reply said there was a paper by Green—a collaborator of Bingham—in the March issue of the *Journal of Industrial and Engineering Chemistry*, which anticipated a good deal of work which he himself had contemplated for the future and which had a close bearing on the points mentioned by Dr. Martin. The question of coal dust in pipes was very interesting and he thought the explanation was to be found in the layer of adsorbed air to be found round each particle of coal. This phenomenon was met with in pigments. Certain pigments, notably carbon black, had a very different apparent bulk from the bulk which would be argued from a consideration of the specific gravity. In reply to Mr. Bawtree and his criticism of the possibility of applying the results in practice, he thought it was a pity that view should be taken. Americans were becoming more and more scientific in their methods, and were bringing out a good deal of work which ought to have been done in this country.

## The Chemistry of Milk

### The Essential Functions of the Chemist

SOME aspects of the chemistry of raw and dried milk were discussed at a meeting of the Chemical Society of the University of Birmingham on Monday, March 5, by Dr. L. H. Lampitt, F.I.C., chief chemist to J. Lyons and Co., Ltd., and to Dried Milk Dairy Products, Ltd. The subject of milk, and especially dried milk, he said, was chosen because it furnished an excellent example of an industry in which a chemist was absolutely essential. Some of the faults both on the sides of the employers and of the employees which had acted as retarding influences in the association of chemists and commercial concerns were indicated. Boards of directors were given to thinking that the chemist was a magician, and that once having taken the step of employing a chemist, they had only to say, "Do this," or "Do that," and the following day the chemist would run to them with the whole of their difficulties solved. On the other hand, the chemist was too prone to sit in the laboratory or in his office and think only of the chemical side of the industry, sending out reports in terms that the average manager and director could not understand, and showing no desire to interest himself in the purely practical side of the firm's activities.

The manufacture of dried milk was essentially one where the chemist came in at all stages of the process; routine control in the broadest sense of the word was an absolute necessity. He was the means by which the fat, and solids not fat, arriving in the factory as raw milk were accounted, for either as full cream milk powder or skim milk powder and cream. Moreover, the production of a high quality dried milk powder required constant vigilance from the chemical point of view, and in the lecturer's experience it was only by such vigilance that milk powder of 100 per cent. solubility in cold water with practically the whole of the albumen uncoagulated and with the final powder giving a strong peroxidase reaction and a rennet clot practically indistinguishable from that of raw milk, could be obtained.

The whole of the processes involved in the production of milk powder were described with the aid of lantern slides, showing the outstanding patented machines in use at the present time. These included the Just Milk Drier as illustrating the Hatmacker process, the Passburg Plant as illustrating the vacuum roller process driers, the Stauf as illustrating the older form of spray process, the Merrel-Soule, being a development of the Stauf and the Gray Milk Drier, the only plant which, to the lecturer's knowledge, dried whole milk without pre-condensing.

A description was given of crystalline forms of the sugars and of citric acid found in condensed milk and the question of the type of cooling condensed milk and its effect on the crystalline form was discussed. Standard types of vacuum pans were described and one of the important duties of the chemist, the standardisation of the batch, considered. Full cream milk powder and skim milk powder were described in detail, and slides of photomicrographs of milk reconstructed from roller processes, and spray process powder were shown in order to demonstrate the great difference between them. The effect of the original bacterial content of the raw milk on the milk powder was considered, the need for pasteurisation, and the effect of drying, on the bacteria being described.

### Improvement of Die-Casting of Metals

AMONG the papers read at the annual general meeting of the Institute of Metals last week was one by Dr. W. Rosenhain in collaboration with Mr. S. L. Archbutt and Mr. S. A. E. Wells, dealing with experiments they have been making on the chill casting of the "Y" alloy of aluminium. There was considerable difficulty in obtaining good castings. It was found that by proper proportioning of the cross-sectional area of the mould to the cross-sectional area of the casting, the marked difference of density between the exterior and interior of cast rods could be eliminated, and the density even of the central core of the cast rod could be brought to a value closely approximating to that of the alloy in the wrought condition (2.80). The temperature and method of pouring the molten metal into the mould was also found to be very important. These results have an important bearing on die-casting generally of any metal in metal moulds, in connection with the production of castings of maximum soundness and strength.



## February Trade Returns

### A Slight Decrease

ACCORDING to the Board of Trade Returns, the value of the exports of chemicals, drugs, dyes and colours for February was £1,952,630, an increase over the corresponding month in 1922 of £395,746, though £284,671 less than January. Imports were £1,147,509 in value, compared with £843,886 last February and £1,223,593 last month. The value of both imports and exports is still below the 1921 figures.

The detailed import figures show the most remarkable increase in the case of borax, being 8,404 cwt. for February and 2 (two) cwt. for January. The average for the two months, however, is about normal. The following figures give the imports in cwts. for February, the January figures being given in parentheses. *Increases:* Acetic acid (including acetic anhydride), 526 tons (508 tons); tartaric acid and tartrates, except cream of tartar, 2,278 (2,154); glycerin (crude), 1,329 (747); red and orange lead, 4,103 (2,925); potassium compounds except nitrate, 483,912 (329,221); cream of tartar, 4,684 (4,326); zinc oxide, 759 tons (657 tons). *Decreases:* These are particularly noticeable with the nitrates, e.g., potassium nitrate (saltpetre), 5,982 (31,365); sodium nitrate, 89,465 (230,502); bleaching materials, 1,981 (3,804); calcium carbide, 41,080 (67,356); distilled glycerin, 273 (363); nickel oxide, 1,393 (2,140); compounds of sodium other than nitrate, 27,621 (42,340).

### Coal Tar Products

The imports of coal tar products show a decrease compared with previous years, both in intermediates and finished dyes with the exception of synthetic indigo (complete figures are not given). In exports there has been an all round decrease in "crudes," excepting carbolic acid, which was 10,153 cwt. as against 8,036 cwt. exported in January. Dyestuffs produced from coal tar have also decreased from 10,468 cwt. to 4,104 cwt. Detail figures (in cwts.) are: Anthracene, nil (200); benzol and toluol, 801 gals. (4,495 gals.); naphtha, 2,405 gals. (4,311 gals.); naphthalene, 12,776 (13,528); tar oil, creosote, etc., 1,668,768 gals. (4,627,684 gals.); other unspecified products, 34,002 (42,444).

Sulphate of ammonia shipments declined from 23,836 tons in January to 22,159 tons last month, nearly double the 1922 figures, however. Spain and the Canaries took a large proportion of this export—8,217 tons against 9,816 in January. France received 5,791 tons; Dutch East Indies, 3,566; Japan, 2,050; British West Indies and British Guiana, 745; Italy, 241; other countries taking 1,549 tons.

### Exports of Chemicals

The figures for the exports of other chemicals show a decrease in most cases, the details (in cwts. unless otherwise stated) compared with January being:—*Increases:* Sulphuric acid, 1,550 (1,157); copper sulphate, 8,575 tons (3,111 tons); British prepared saltpetre, 2,050 (914); potassium compounds other than nitrate, chromate, and bichromate, 2,489 (933); crude glycerin, 524 (232). *Decreases:* Tartaric acid, including tartrates not otherwise specified, 1,867 (2,724); ammonium chloride, 283 tons (569 tons); distilled glycerin, 4,460 (5,079); potassium chromate and bichromate, 2,526 (3,572); sodium carbonate, including bicarbonate, soda crystals and soda ash, 442,937 (582,810); caustic soda, 120,993 (147,257); sodium chromate and bichromate, 4,423 (7,522); sodium sulphate, including saltcake, 41,551 (81,943); other sodium compounds, 41,225 (58,330); zinc oxide, 135 tons (204 tons).

### Painters' Colours and Materials

The figures (in cwts.) for trading under this heading for the past month are as follows, the January figures being given in brackets:—*Imports:* Barytes, including blanc fixe, 55,870 (76,355); white lead (basic carbonate), 7,813 (12,216); other sorts of painters' colours and materials, 51,433 (46,072). *Exports:* Barytes (ground, including blanc fixe), 4,101 (9,994); white lead, 17,497 (15,365); paints and colours ground in oil or water, 27,738 (39,336); paints and enamels ready mixed, 21,769 (20,910); other sorts not specified, 34,280 (49,948).

### Fall in Prices

CENTRIFUGAL SEPARATORS, LTD., who are associated with Vickers, Ltd., announce an all-round reduction in the prices of Gee centrifugal separators.

## Society of Public Analysts

At a meeting of the Society on Wednesday, March 7 (Mr. P. A. Ellis Richards, president, in the chair), a certificate was read for the first time in favour of Mr. J. Myers, F.I.C., and Mr. J. L. Buchanan, F.I.C. Certificates were read for the second time in favour of Messrs. J. J. V. Backes, A.R.C.Sc., A.I.C., D.I.C.; S. G. Stevenson, A.I.C.; L. B. Timmis, M.Sc.Tech.(Manch.), A.I.C.; R. W. Sutton, B.Sc.Tech.(Manch.), A.I.C.; A. E. Johnson, B.Sc.(Lond.), F.I.C., A.R.C.S.I.; E. V. Jones, F.I.C.; F. K. Donovan, and S. G. Liver-edge, F.I.C.

The following were elected members: Messrs. G. H. Appleyard, F.I.C.; J. W. Black, B.Sc.(Lond.); A. W. Starey, A.R.C.S., B.Sc.(Lond.), A.I.C., and J. M. Wilkie, B.Sc.(Lond.), F.I.C.

### Abstracts of Papers

In a paper on "The Examination of Firearms and Projectiles," by Mr. A. Lucas, F.I.C., the scientific methods used for the identification of firearms and projectiles in cases of wounds or deaths from shooting were discussed. The composition, dimensions and markings on bullets, slugs, etc., were described, and directions given for the reproduction of rifling marks on bullets, and for the chemical analysis of projectiles of all kinds.

A paper on "The Interpretation of the results obtained in the Analysis of potable Waters," by Mr. R. C. Frederick, gave an account of an extended investigation into the chemical changes which occur in samples of excretally polluted water. The findings were considered in conjunction with the results obtained by the author in the analysis of a very large number of samples from every kind of supply throughout the British Isles. The orthodox ideas in regard to the interpretation of the analytical results of such examinations were criticised and the author's own views stated.

Mr. S. B. Phillips, A.I.C., in a paper on "Determination of the Purity of Vanillin," reviewed the various methods proposed from time to time, and described two processes for estimating vanillin. The first was a volumetric one where 1 gram of vanillin was dissolved in 20 c.c. of neutral alcohol and acid impurities were neutralised. 1·2 grams of p-toluidine were then added and 20 c.c. of semi-normal sodium hydroxide solution were measured in, followed by 100 c.c. of cold water. The solution at 15° C. was titrated with semi-normal sulphuric acid until the permanent precipitate of the condensation product of vanillin and p-toluidine was formed. The difference between the volumes of alkali and acid represented the volume of alkali required to combine with the vanillin. A summary of the gravimetric method is as follows:—

One gram of vanillin is dissolved in 13·6 c.c. of semi-normal sodium hydroxide. To this is added a solution of 2·4 grams semi-carbazide hydrochloride plus 3 grams of anhydrous sodium acetate or 5 grams of the crystalline salt in 30 c.c. of water. The mixture is heated on a boiling water-bath for 10 mins., allowed to stand in the cold for four hours and the semi-carbazone filtered off, washed, dried, and weighed. It is treated with ammonium hydroxide solution, and the insoluble portion filtered off, washed, dried, and weighed. This weight is deducted from the original weight of semi-carbazone, and the remainder calculated to vanillin.

### The M.G.C. Manchester 1923 Year Book

THE third annual edition of this handbook (published by the Manchester Guardian, Ltd., pp. 160, 2s. 6d. net) contains a wealth of information on all subjects of interest to those concerned in the trade and general activities of Manchester. There is not space to mention all the sections, one of which is a valuable "Who's Who" of Manchester men. In the section on chemicals and dyes is recorded the progress made in the district during the past year, notably the introduction of the "ionamine" dyes by the British Dyestuffs Corporation.

### "Invaluable"

FROM a well-known Cheshire chemist, dated March 6, 1923: "May I say how very much I appreciate the copy of *The Chemical Age Year Book and Diary*? It is a production which I am sure will prove invaluable, not only for the useful chemical data and tables it contains, but also for the very complete list of advertisements."



## British Chemical Standards Movement

### Recommendations for Extended Use

FROM a report on the second three years' working of the British Chemical Standards Movement organised by Ridsdale and Co., Middlesbrough, it appears that within the past six years the movement has been steadily developed and become consolidated. Not only are most of the large works' laboratories and many public ones in this country using these standards, but their use has so spread that sole agents have been appointed in Italy and France. The 450 British and foreign users include 10 government departments, 30 universities and technical schools, and 5 railways.

The work of the organisation, it is stated, has demonstrated that: (1) In analysis divergencies occurred to an unrealised degree on every sample tested, even under the most favourable conditions of homogeneity and careful working; (2) jointly standardised samples were a necessity to reveal these divergencies and clear them up; (3) the rapid development of their movement and consequent creation of such standardised samples for certain types of material was the surest way to analytical co-ordination—which desideratum not only vitally affected the value and status of chemists, but gave the maker a definite gauge for his manufacture, secured for the engineer or user closer adherence to specification, and saved many delays in delivery and disputes which now occurred; (4) the same methods used for iron and steel standards could be applied with equal efficiency to other materials.

Among the resolutions was one that the fullest use should be made of standard analysed samples of steel, iron, and other substances, particularly (1) by engineers, in their chemical specifications, referring regularly to some specific standard sample of similar type, and requiring that in cases of dispute a check analysis of it should be made concurrently by the reference chemist, as a gauge of the values found; (2) by chemists using them, periodically for checking and co-ordinating their routine tests and invariably as an aid to settling disputes, stating on their reports that such standards had been used.

A committee was appointed to consider the question of forming a more formal organisation with separate official headquarters, and to submit a report.

### British Chemicals for Czecho-Slovakia

THE Commercial Secretary at Prague (Mr. W. F. Vaughan Scott) reports that up to the present no falling off in the imports of chemicals from Germany has been noticeable, but there is no doubt that, owing to the rapid increase in prices of all German chemicals and to the difficulty which importers anticipate experiencing in obtaining delivery of goods, an increased demand is likely to arise for the following British chemicals:—Coal-tar and its derivatives; resin; cresines and petroleum jelly; refined yellow and white beeswax; oils for perfumes, soapmakers and for medicinal purposes; pharmaceutical products; photographic chemicals; raw materials for the chemical industry.

The Commercial Secretary has also furnished (1) the names and addresses of agents who might suitably represent British firms of chemical manufacturers, and (2) a list of the most important Czecho-Slovakian importers of chemicals. Copies of these lists may be obtained by interested United Kingdom firms upon application to the Department of Overseas Trade, 35, Old Queen Street, Westminster, London, S.W.1. Reference No. 18,630/F.W./C.P. should be quoted.

### Manufacturing Chemist's Affairs

AT a meeting of the creditors of Thomas William Stone, trading as Stone and Tinson, Crewe Hole, St. George, Bristol, manufacturing chemist, the statement of affairs showed liabilities amounting to £4,493 os. 3d., of which £1,369 is. 7d. was due to the trade, and £3,123 18s. 8d. was due to cash creditors. There were also fully secured creditors for £311 os. 8d., who held security valued at £472 8s., and other liabilities to the widow of T. W. Stone £1,100, but this was not expected to rank for dividend. The business was established about 65 years ago, and was carried on by Mr. Thomas Stone, until his death a few years ago. It was then continued by his two sons. A gentleman interested offered a composition of 6s. 8d. in the £, payable in cash, and the offer was accepted.

## Sewage Treatment by Bio-Aeration

THE first instalment of a new system of sewage disposal at the Rotherham Sewage Works has just been put in operation by Mr. John Haworth, the general manager and chemist of the Sheffield Sewage Disposal Department, who has been acting as consultant. The new system, called the bio-aeration system of sewage treatment, is designed to deal with 1,000,000 gallons per day dry weather flow, and is constructed on the principle of a 500,000 gallons per day experimental unit at Sheffield, which was designed to the requirements of Mr. Haworth, and which has been in operation for two years and is giving excellent results. The sewage is passed into a large tank, divided into channels, which in effect converts the tank into a channel or stream over one mile in length. The liquid is driven along this channel by means of paddle wheels where it is brought into intimate contact, for the necessary periods, with highly oxidised humus or sludge, in which numbers of bacteria have been cultivated. The contact is obtained by circulating the contents of the tank at a velocity which prevents settlement of the solid matters. The oxygen necessary to maintain the biological life is provided by producing as much change of surface of the liquid as is necessary to ensure sufficient solution of oxygen from the atmosphere. A proportion of liquid is being continuously taken out at a point remote from the inlet, equal in volume to that of the sewage which is being added. This portion passes to the settling tanks in order to separate the purified liquid from the sludge and thence to the river. A large proportion of the bacterial sludge, which is the purifying agent, is then returned into circulation.

These works at Rotherham are the first of many now being constructed on what is commonly known as the Sheffield system. Another instalment, exactly similar to that now working, is in process of construction, and the whole works, when completed, will have cost nearly £50,000.

## A China Clay Brochure

THE firm of English China Clays, Ltd., may be congratulated on publishing and Mr. Edgar Sessions on editing a very handsome and well-designed brochure on the company's China Clay works in Cornwall and Devon. The edition which is of folio size, is limited to one thousand specially numbered copies, which will be valued for their beautiful letterpress and illustrations, as well as for their full and interesting account of an industry confined to a secluded part of the country, but supplying material of great importance to many trades. To an outsider, with little knowledge of the Cornish clay pits, the picture this publication gives is something of a revelation. Here on these beautifully printed and illustrated pages we see without effort the industry under many aspects—the personalities responsible for the enterprise, the clay fields and the modern methods of working them, the treatment of the clay for the various uses to which it is put, the vast organisation for its handling, distribution and shipment abroad, and finally the community of workers who have grown up around the mines. From the point of view of trade publicity the publication may be commended as an example of good taste and real commercial enterprise.

## Chemical Reparations

THE Reparations Commission in Paris has adopted the decision (by three votes and one abstention) that for a temporary period ending April 30, 1923, Germany must deliver to France 2,000 tons of fixed nitrogen according to Annex II. in the form of 10,000 tons of sulphate of ammonia; to Italy 1,200 tons of nitrogen in the form of 6,000 tons of sulphate of ammonia; to Belgium 1,000 tons of nitrogen in the form of 5,000 tons of sulphate of ammonia; and that in addition to the deliveries already due to France by virtue of the protocol of February 24, 1922. It was also decided by three votes against one to approve for the period, May 1, 1923, to April 30, 1924, an order for 30,000 tons of nitrates (not included in the quantities that the French Government has demanded directly from the German Government), which will not be notified to Germany until after the specifications and necessary arrangements have been supplied by the countries concerned and approved by the Reparation Commission.

## Chemical Matters in Parliament

### Ireland and the Dyestuffs Act

In answer to a question by Lieut.-Col. Hilder, the Chancellor of the Exchequer (House of Commons, March 13) said that he was not aware that German dyestuffs, subject to the restrictions laid down by the Dyestuffs Act, were being improperly introduced into this country from the Irish Free State.

### Compensation for Rumanian Oil Wells?

Sir Philip Dawson (House of Commons, March 12) asked a question regarding the compensation of British owners in connection with oil-wells, etc., destroyed in Rumania in 1916. He received the reply that negotiations were in progress with the Rumanian Government regarding the amount of compensation and manner of payment, but that, pending their conclusion, a full statement was not possible.

### China Clay Workers

Captain Shipwright (House of Commons, March 7) asked the Minister of Labour whether he could give the number of china clay workers registered as totally unemployed on November 1, 1922, and March 1, 1923; and, if so, what were the figures.

Sir M. Barlow: The numbers of china clay workers registered at Employment Exchanges as unemployed at the nearest dates available are 254 at November 11, 1922, and 140 at February 5, 1923.

### Poison Gas in War

Mr. Newbold (House of Commons, March 8) asked the Under-Secretary of State for War what were the sources of manufacture, *i.e.*, dyeworks and chemical factories, which could, in France, Germany, Italy, the United States of America and Japan, be made available for the production of poison gases within a week of their mobilisation for that purpose?

Lieut.-Colonel Guinness replied that he was not in a position to give that information.

### Export of Pitch

Replying to a question by Mr. Mardy Jones, Viscount Wolmer (House of Commons, March 13) said that the total quantity of pitch produced in the United Kingdom in 1922 was 514,236 tons, of which 16,248 tons were produced in South Wales. The total exports of pitch in 1922 amounted to 428,317 tons. Twenty tons were registered as consigned to France from ports in South Wales. No consignments to Belgium were registered at South Wales ports.

### The Supply of Coke

Sir W. de Freese (House of Commons, March 8) asked the President of the Board of Trade whether sufficient coke would, so far as can be ascertained, be available to keep the blast furnaces in this country in full production, with the consequent avoidance of unemployment; and what were the reasons for the reported shortage of coke at the present moment?

Lieut.-Colonel Lane-Fox replied that every effort was being made by suppliers of coke to meet inland requirements. The recent sharp increase in the demand for British coke was no doubt mainly caused by uncertainties about supplies from the Ruhr coalfield.

### Safeguarding of Industries Act

Mr. Foot (House of Commons, March 12) asked the Chancellor of the Exchequer what was the total amount collected by way of duties under the Safeguarding of Industries Act up to and including March 1, 1923; and what proportions of the total amount had been collected from France, America, Germany and Belgium.

Mr. Baldwin replied that the figures up to and including February 28—the latest date to which they are available—were: France, £63,669; United States of America, £89,911; Germany, £402,130; Belgium, £9,050; other countries, £73,799; total, £638,559.

### Import of Dyestuffs

Viscount Wolmer (House of Commons, March 13), replying to a question by Mr. Grattan Doyle, said that the total number of applications for licences under the Dyestuffs (Import) Act during the months of January and February was 1,208. Licences were granted in 822 cases, in 141 cases applicants were referred to available supplies of reparation dyestuffs, in 215 cases licences were refused and the applicants referred to British manufacturers of similar products, and on February 28 30 applications were outstanding, of which a number had been received on that day. Of the total number of applications received, 971, or 80 per cent., were dealt with either by the

grant or refusal of a licence, or by reference to reparation stocks, within three days, and 1,131, or 94 per cent., within one week.

### British Cellulose

Mr. Graham White (House of Commons, March 13) asked the Chancellor of the Exchequer the exact nature of the services for which the Government directors of the British Cellulose and Chemical Manufacturing Co., Ltd., received £1,000 in 1922-23, and are to receive £500 in 1923-24.

Mr. Baldwin replied that the services referred to were those normally performed by directors of public companies.

Mr. White then asked if there was any special reason why these fees should not be paid by the company rather than by the British taxpayer.

Mr. Baldwin answered that he understood the special reason was the one that existed in several cases of companies that were founded during the war, where a Government director was there on purpose to watch the interests of the Government and the taxpayer, and was paid as their guardian and representative.

## The Place of Chemistry in War

### Lecture by Major Lefebure

At a meeting of the Liverpool and North-Western section of the Institute of Chemistry, on Thursday, March 8, Major V. Lefebure gave a lecture on "Chemical Warfare."

Whether we wished to be in the position to wage successful war, and to strike a rapid and successful blow, or whether we wished to guard in general against any such possibility by employing measures of disarmament, our attention, said Major Lefebure, must be focussed upon the weapon which lends itself most to sudden and decisive surprise, *i.e.*, the weapon in the employment of which the required preparations were most silent and secret, from the point of view of both design and manufacture.

It was a safe assumption that in any future war, and unless disarmament in the meantime became a far more real and practical proposition, probably the earliest and perhaps the only necessary step would be to paralyse great centres of industry, of civil and military administration of government. Judging from all the facts at their disposal, including the experience of the war, chemical warfare would be hundreds if not thousands of times more effective for this purpose than the uses of explosives or of any other known and proved type of casualty producer. In terms of energy and efficiency consideration chemical warfare was the weapon of the future, and they must be ready to defend themselves against it.

The possible attack upon new human functions, an attack unsuspected and therefore unguarded against, an attack against which no protection might develop for years, even under the most intensive investigations, was perhaps the chief reason for regarding chemical warfare as the most important factor in any scheme of national armament, or in the possible alternative of international disarmament. Chemical warfare was the most important issue in the visible future of armament, whether they took the view of an unhampered and vigorous development or whether they wished to check its sinister possibilities, and they must be ready for it in every way.

### Official Indifference

Where chemistry had incidence on national policy and required the help of statesmanship, we were inadequate. A certain very high official who controlled more than a million of national expenditure per annum on certain developments vital to the country, and for which synthetic organic chemistry had real critical importance, and to which that same science was capable of making big contributions, in a discussion with an intimate friend of his (the lecturer's), concluded with words somewhat on the lines of the following:—"I really don't understand these things, and therefore don't trust them. Frankly, I have no use for this organic muck." Judging from German progress in that same field, it was quite clear that their money and policy had more informed and intelligent guardianship; in fact, he supposed in that country it would be as much as a man's post and reputation were worth to make such a statement, even to friendly ears.

It was quite clear that, whatever disarmament measures were agreed to amongst the Powers with regard to other phases of chemical warfare, we could not tie our hands regarding the vital step of production.



## From Week to Week

THE ARGUMENTS in the appeals between Brunner, Mond and Co., and the Manchester Ship Canal Co. were concluded in the House of Lords on Thursday, March 9, when judgment was reserved.

THE ANALYTICAL LABORATORY at the premises of Jones and Johnson, public analysts, Victoria Street, Wolverhampton, was seriously damaged by a fire which occurred on Thursday, March 8.

AMONG those who were presented to his Majesty at the levee at St. James's Palace on Tuesday were Sir Max Muspratt, on being made a baronet, and Viscount Leverhulme, on being created a viscount.

THE WARMINSTER URBAN COUNCIL has at present under consideration an application by the Warminster Timber Co. for the purchase of a strip of land adjoining the Great Western Railway, on which the company propose to establish a wood distillation industry.

MR. H. M. RIDGE, of the Ridge Roasting Furnace and Engineering Co., London, is expected back in London in a few days, after a nine months' tour abroad, during which he visited South Africa, Rhodesia, Western Australia, Ceylon, India, Persia, and Mesopotamia.

THE BUYS BALLOT MEDAL, instituted in memory of the Dutch professor of chemistry and metallurgy, who discovered that metal expanded under the application of heat, has been awarded by the Dutch Royal Academy of Science to Sir Napier Shaw, a former director of the Meteorological Office, London.

IN their report for February Lloyd's Bank states that a fairly decided development has occurred in the china clay trade, which last year attained 75 per cent. of pre-war volume, the figures being higher than in any year since 1914. The export trade has expanded, American and Canadian trade being particularly satisfactory.

ACCORDING to a CORRESPONDENT of the *Times Trade Supplement* in Germany an outstanding feature of the chemical trade there has been the rise in the price of coal tar products, particularly of carboic acid crystals which have risen from about 6d. per lb. to 1s. 6d. per lb., owing largely to the Japanese demand. It is also reported that at least one of the big dye manufacturers has found it necessary to ration its customers owing to shortage of supplies.

MR. A. MALACRIDA, the secretary of the Tar Distillers' Association, states that the Ruhr situation is the cause of the remarkable upward bound in the export of coal tar pitch disclosed by the new Board of Trade returns. During January and February the quantity sent abroad was 123,239 tons, compared with 74,878 tons for the same period last year. It is going from all parts of the country to the Continent, but chiefly to France, for patent fuel making.

MR. NORMAN SWINDIN, A.M.I.Mech.E., in an article in the *Manchester Guardian* recently, dealt with the research question in chemical engineering. He pointed out particularly that though the value of research is being gradually recognised, the only way the research worker can at present gain the necessary wide experience, is by sacrificing himself for years by taking a succession of posts at nominal rates and obtaining the unjustified reputation of an industrial adventurer.

THE PUBLIC EXAMINATION was concluded on Tuesday, in the London Bankruptcy Court, of Mr. Henry Maconochie, Harrington Road, South Kensington, who had been interested in certain oil and chrome bearing properties and in patents for the manufacture of tin oxide. The statement of affairs showed liabilities £68,674, of which £57,795 were expected to rank, and assets three bad book debts of the nominal value of £2,075, but to which no realisable value was attached.

THE NEW EXPLOSIVES BILL, the text of which was issued last week, provides that where the Secretary of State is satisfied that owing to the existence of any special circumstances, special precautions require to be taken under Section 23 of the Explosives Act, 1875, for the prevention of accidents by fire, explosion in any such factory, magazine, store, or registered premises as is referred to in that section, or for preventing unauthorised persons having access thereto, he may by order prescribe the special precautions to be taken.

DR. H. E. WATT presided over the annual general meeting of the Edinburgh and East of Scotland Section of the Society of Chemical Industry, held on Wednesday, March 7. The following office-bearers were appointed for the ensuing session: Chairman, Dr. Alexander Lauder; vice-chairman, Dr. H. E. Watt; honorary secretary and treasurer, Mr. W. T. H. Williamson, B.Sc. Mr. J. Rutherford Hill, Ph.C., then read a paper entitled "Some Interesting and Historical Museum Specimens," dealing principally with alkaloids.

PROFESSOR BARTON SCAMMELL, president of the Radium Institute at Dover, is reported to have discovered a new fertiliser. It consists of lava from Mount Vesuvius, treated with a radio-active solution. The lava contains magnesium, calcium, sodium, potassium, titanium, iron, silicon, aluminium, phosphorus and other elements which would make it a good fertiliser. They are not, however, in a soluble form, but when the powdered lava has been subjected to Professor Scammell's radio-active treatment this difficulty is said to be overcome.

TULLY GAS PLANTS, LTD., Newark-on-Trent, have received an order from Suzuki and Co. for two 500,000 cub. ft. per 24 hours modified Tully gas plants complete with superheaters and revolving grates, for the production of gas rich in hydrogen, from coal. These plants will be worked in connection with the Claude process for the production of synthetic ammonia. This order is the result of experiments which have been carried out during the past twelve months at Newark and are expected to have far-reaching results in several directions.

THE COUNCIL of the Institution of Mining and Metallurgy have awarded the gold medal of the Institution to Mr. Edgar Taylor, president, 1909-1911 and 1916-1918, in recognition of his services to the institution since its foundation in 1892, and his work in connection with the development of the mining industry, particularly in India. The Gold Medal of the Consolidated Gold Fields of South Africa, Ltd., has been awarded to Dr. Leonard Hill, F.R.S., in recognition of his valuable researches on ventilation; and the company's premium of 40 guineas to Mr. Henry Francis Collins.

MR. GEORGE EMBREY, whose death took place at Gloucester on Saturday, in his 83rd year, had held for some years the posts of county, city and agricultural analyst for Gloucestershire. In 1913 he was elected a vice-president of the Society of Public Analysts, serving for six years as a member of the Council, and in 1916 he became president. He also served as president of the Midland Photographic Federation. A well-known Freemason, he was elected W.M. of the Royal Lebanon Lodge in 1903 and became Provincial Grand Superintendent of Works in 1905. He and Mrs. Embrey celebrated their golden wedding in 1913.

PROFESSOR J. D. VAN DER WAALS died at Amsterdam on March 8, aged 85 years. For many years professor of theoretical physics at Amsterdam University, he is known to scientists all the world over as the author of the famous "equation" modifying Boyle's Law for gases. It is not too much to say that the work he did in this connection and on thermodynamics generally stimulated all the research which has made the liquefaction of gases a practical industrial fact of first importance, and given valuable information regarding change of state and the methods of producing low temperatures. He was awarded the Nobel Prize for Physics in 1910, amounting to £8,000. He was an honorary member of the Royal Institution and an Honorary Fellow of the Chemical Society.

THE BRITISH CHEMICAL TRADE ASSOCIATION, in a circular on the occupied territories in Germany, states that the Franco-Belgian authorities have thrown a circle of Customs barriers completely round the Cologne area occupied by British forces. All British goods passing either in or out of this barrier are stopped and a tax of 10 per cent. *ad valorem* is levied by the Franco-Belgian Customs. Traders, it is stated, are experiencing serious difficulties and those having goods held up by the Franco-Belgian authorities are advised to communicate immediately with the Assistant Secretary, Board of Trade (Commercial Relations and Treaties Department), Great George Street, S.W.1, giving the fullest particulars of the consignments (name of suppliers, when and where licences were applied for, what duties have been paid, stating date and place of payment, etc.).



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## Patent Literature

### Abstracts of Complete Specifications

192,778. FERTILISER, PRODUCTION OF MATERIAL SUITABLE FOR. E. L. Pease, Hurworth Moor, Darlington. Application date, November 8, 1921.

The fertiliser is produced by the absorption of ammonia in a porous material such as peat, powdered coal, or coke, which is saturated with a solution of phosphoric acid. Gas containing ammonia, or pure ammonia gas evolved by the treatment of an ammonia or other nitrogen compound, is passed upwards through an inclined rotary tube through which the absorbing material passes downwards. Raw peat usually contains about 90 per cent. of water, which is not readily reduced below 60-70 per cent., and such peat when mixed with phosphoric acid solution would contain too much water for the efficient absorption of ammonia. This is avoided by mixing peat containing about 70 per cent. of water with about twice its weight of dry powdered coke, coal, clay or shale, which is free from calcium compounds. The addition of coke renders the final product more porous. The phosphoric acid may be obtained by treating calcium phosphate such as phosphate rock with sufficient sulphuric acid to produce orthophosphoric acid, which is then separated from the calcium phosphate. The absorption of ammonia is carried out at atmospheric temperature, yielding in succession mono-ammonium phosphate, di-ammonium phosphate, and tri-ammonium phosphate, which are acid, neutral, and basic respectively. It is found that the tri-ammonium phosphate retains its ammonia constituent when mixed with peat even after exposure to the air. If the absorption is effected at a higher temperature, neutral di-ammonium phosphate is the product. In this process it is possible by the use of three molecules of sulphuric acid to obtain a fertiliser containing six molecules of combined ammonia and two molecules of soluble phosphate. A fertiliser consisting of a mixture of separately produced calcium phosphate and ammonium sulphate containing the same proportion of ammonia and phosphate would require the use of five molecules of sulphuric acid. This process, therefore, requires considerably less sulphuric acid. If the ortho-phosphoric acid used contains some sulphuric acid this will be converted into ammonium sulphate. When peat is used as the porous base of the absorbing material the final product will contain additional nitrogen and potash.

192,791. FIXATION OF ATMOSPHERIC NITROGEN, PROCESS FOR. F. C. Dyche-Teague, 258, Gloucester Terrace, London, W.2, A. Wilson-Hughes and F. J. Commis, 5, Victoria Street, Westminster, London, S.W.1. Application date, November 11, 1921.

The process is for fixing atmospheric nitrogen by bringing it into contact with a heated mixture of carbon, alkali, and a metal catalyst. When the materials are employed in the form of fine powder, which is agitated in a retort, it has been found that the carbon and metal oxide, *e.g.*, iron oxide, are partly carried off by the rapid current of nitrogen passing through the mixture, particularly at temperatures below the melting point of the alkali. Further, at temperatures over 850° C., the mass becomes plastic and is not easily penetrated by the nitrogen or removed from the retort on the completion of the operation. In this process the mixture of carbon, alkali and metal is first treated with an emulsified sulphur-free oil, and then dried and reduced to a granular mass. The constituents are thus retained in intimate contact and not separated by the current of gas. A suitable emulsifying agent is sodium rosinate. The mixture is heated in a retort to 900°-1050° C., and the grains retain their form by the fusion of the sodium rosinate and the production of porous carbon by the decomposition of the oil. The mixture in passing through the retort is subjected at intervals, for a period of 10-15 minutes, to an atmosphere containing 25-50 per cent. of hydrogen. This is effected by shutting off the nitrogen and introducing superheated steam at 900°-1100° C. into the retort immediately above the cyanising zone. Hydrogen is produced by reaction with the reduced iron, and the iron oxide is then reduced by the carbon or carbon monoxide. It is found that this treatment increases the

activity of the material, and the proportion of alkali converted into cyanide may be 75-85 per cent. A suitable reacting mixture comprises carbon 1 part, soda ash 1 part, iron oxide 0.9 part, and nickel oxide 0.1 part. If the nickel oxide is omitted the reaction proceeds at only half the rate.

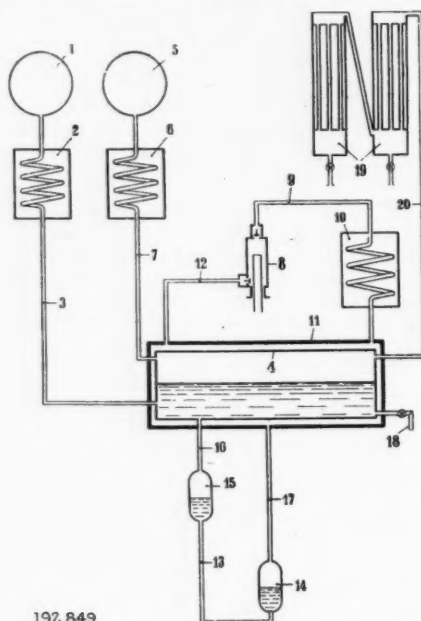
192,842. NEW DYESTUFFS, MANUFACTURE OF. A. G. Bloxam, London. From Akt.-Ges. für Anilin Fabrikation, Berlin-Treptow, Germany. Application date, November 28, 1921.

These dyestuffs are obtained by condensing the following:—(1) A para-diazine, *e.g.*, a phenazine or a naphthazine, in which there is substituted for hydrogen in the para-position to a nitrogen of the azine ring a group containing hydrogen capable of being exchanged for a metal, such as eurhodols or naphthsultamphenazine; (2) A 1:4-quinone or a naphthsultamquinone containing halogen as a substituent in the 2-position. The two compounds are heated together, preferably in the presence of a substance which absorbs the mineral acid liberated. In some cases an oxidising agent such as air may be blown through the solution or a metal such as copper may be added. In an example, eurhodol is obtained by the condensation of 2-oxy-1:4-naphthoquinone with 1:2-diaminobenzene, and is then heated for one hour to 120°-130° C. with 2-chloro-1:4-naphthoquinone, anhydrous sodium acetate and nitrobenzene. Part of the dyestuff is separated by filtering and the remainder by steam distillation of the nitrobenzene. The dye is a yellow powder soluble in concentrated sulphuric acid to an orange-brown solution. The dye may be treated with hydrosulphite and sodium hydroxide, yielding an orange vat which dyes cotton a fast yellow. Other examples are given in which:—(1) 2-oxy-5-methyl-1:4-benzoquinone is condensed with 1:2-diaminobenzene, and the resulting oxytoluphenazine condensed with 2:3-dichloro-1:4-naphthoquinone. (2) Eurhodol obtained as in the first example is condensed with 2:3-dichloro-1:4-naphthoquinone. (3) Eurhodol obtained as in the first example is condensed with chloranil. This dyestuff yields with hydro-sulphite and sodium hydroxide a red vat which dyes cotton dark green which oxidises a brownish-yellow. (4) 2:3-dichloro-1:4-naphthoquinone is condensed with 1:2-diaminobenzene, and the resulting eurhodol is condensed with 2:3-dichloro-1:4-naphthoquinone. (5) Naphthsultam-3:4-phenazine is condensed with 2:3-dichloro-1:4-naphthoquinone. (6) Eurhodol obtained as in the first example is condensed with 2:3-dichloro-4-naphthsultamquinone or 2-mono-chlor-4-naphthsultamquinone. (6) Equimolecular proportions of naphthsultam-3:4-phenazine and chloranil are condensed. This dyestuff still contains 2 atoms of chlorine in the benzoquinone nucleus and may be again condensed with oxyazines.

192,849. LIGHT HYDROCARBONS FROM CARBON, MINERAL OILS AND HEAVY HYDROCARBONS, PROCESS FOR MANUFACTURING—BY MEANS OF PRESSURE AND HEAT, WITH OR WITHOUT HYDROGEN. F. Bergius, 6, Jägerstrasse, Berlin, W, Germany, and S. Löffler, 49, Pestalozzistrasse, Charlottenburg, Germany. Application date, November 30, 1921.

The process is for the production of light hydrocarbons by treating carbon or heavy hydrocarbons at a pressure of 100 atmospheres and a temperature of 400° C. It is necessary to use the highest temperature possible since the speed of the reaction increases rapidly with the temperature, but the temperature must not be sufficiently high to cause coking. In this invention the temperature is maintained by surrounding the reaction vessel with a jacket through which a highly compressed heating medium is circulated. If the internal and external pressures are equal, the walls of the reaction vessel may be made thin since they are not under stress. Crude oil is supplied from a tank 1 through a heating coil 2 to the reaction vessel 4, and hydrogen is also supplied from a reservoir 5 through a heater 6 to the reaction vessel 4. The heating medium, which may be carbon monoxide, is supplied at the required pressure by a pump 8 through a heater 10 to the jacket 11 of the reaction vessel 4. The vessel 4 and jacket 11 are connected by pipes 16, 17, to a manometer 13, so that the pressures are indicated and any desired difference of

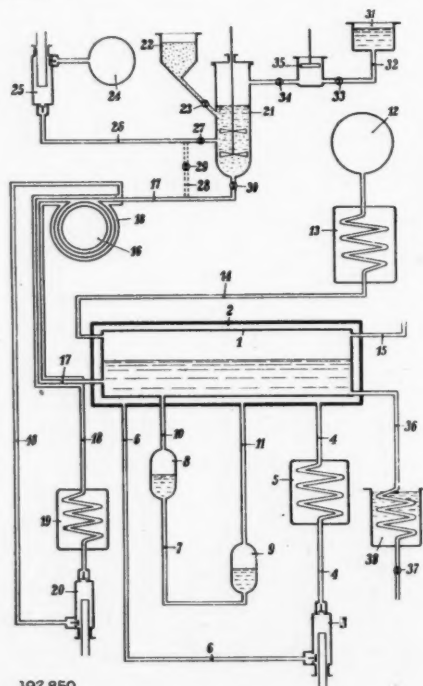
pressure may be maintained. If there is a slight difference of pressure between the two, any injury which may occur to the reaction vessel is indicated by the equalisation of pressure as



192,849

shown by the manometer. The light hydrocarbons are drawn off through the pipe 20 to condensers 19.

192,850. SOLID CARBONACEOUS MATERIALS, MINERAL OILS AND HEAVY HYDROCARBONS, PROCESS FOR THE TREATMENT OF—BY HEAT AND HIGH PRESSURE, WITH OR WITHOUT HYDROGEN. F. Bergius, 6, Jägerstrasse, Berlin, W, Germany, and S. Löffler, 49, Pestalozzistrasse, Charlottenburg, Germany. Application date, November 30, 1921.



192,850

The process is similar to that described in Specification No. 192,849 (above). In this case the reagents are preheated

before their introduction into the reaction chamber, so that the desired temperature in the latter chamber is reached more quickly. The preheating is preferably effected by means of a heating gas, which is at a temperature not exceeding 50° C. above the desired reaction temperature. Any overheating of the reagents is thus avoided. If a solid carbonaceous material such as coal, brown coal, lignite, or turf is used, it is preferably finely reduced and made into a suspension with mineral oils or products of coal distillation such as pitch or tar. The liquid medium may be that obtained by a previous hydrogenation of coal and which is capable of further hydrogenation. When Mexican, Californian or Rumanian rock oils are treated, the separation of thick asphalt or coke during the reaction is prevented by adding inert materials such as diatomite, powdered coke, coal ash or bog iron ore. If the diatomite or bog iron ore is impregnated with alkali it acts as a desulphurising agent for the raw material. In continuous working the spent material which has to be discharged is fluid at the high temperature employed and is not readily discharged at a slow rate under the high pressure. In this invention the spent material is cooled before discharge, until it becomes viscous and more easily regulated. The high pressure heating medium such as carbon monoxide is forced by a pump 3 through a heater 5 to the jacket 2 of the reaction vessel 1, and returns to the pump 3 through the pipe 6. The walls of the reaction vessel may be made thin and the pressures may be indicated by a manometer as described in Specification No. 192,849 (above). Powdered coal is supplied from hopper 22, and oil is supplied from a tank 24 through a pump 25 to a mixing vessel 21. The resulting paste is discharged by means of liquid drawn from a tank 31, and forced into the mixing vessel 21 by means of a pump 35. The mixture passes through pipes 16, 17, surrounded by heating pipe 18, through which a heating medium is forced by the pump 20. The heating medium passes through a heater 19 and returns through the pipe 18. The hydrogen is supplied to the reaction vessel from a reservoir 12 through a heater 13. The spent material is discharged through a pipe 36 to a cooler 38, and thence to a valve 37, which controls the rate of discharge.

192,941. FORMALDEHYDE CONDENSATION PRODUCTS OF PHENOLS, MANUFACTURE OF. J. G. Bytom, 1, Norfolk Avenue, Heaton Chapel, near Stockport, and R. Attwater, Hopwood Street Mills, Preston. Application date, March 1, 1922.

Phenol-formaldehyde condensation products are obtained by the aid of sodium thiosulphate (hyposulphite) or other neutral salt of thiosulphuric acid. In this process light-coloured products are obtained, even by the use of commercial cresylic acid or carbolic acid, with a minimum proportion of formaldehyde, i.e., 40–60 per cent. of 40 per cent. formaldehyde. The condensation takes place rapidly at temperatures above 90°–100° C. and is easily controlled. The products are light-coloured, soluble in alcohol, and are stable with respect to light and air. The thiosulphate is preferably employed in excess, and the excess is used again for a further reaction. In an example, a mixture of 112 lb. of cresylic acid of 98 per cent. purity and free from sulphur, with 72 lb. of sodium thiosulphate and 16 lb. of 40 per cent. formaldehyde, is heated to about 115° C. for about two hours. Further quantities of 16 lb. of 40 per cent. formaldehyde are added at half-hour intervals until 64 lb. have been added. The temperature is lowered to 110° C. towards the end. The product varies from a clear liquid to a plastic or solid material according to the duration of the condensation. If an excess of formaldehyde is used the product obtained is insoluble in alcohol. The soluble products may be hardened by heating to about 140°–200° C. with or without pressure, and the products are very hard and are insoluble in water, oil, benzene, dilute acids and alkalis. Carbolic acid or a mixture with cresylic acid may be condensed with formaldehyde in a similar manner.

192,944. SEPARATING OXYGEN FROM ATMOSPHERIC AIR. Woodall, Duckham and Jones (1920), Ltd., and J. S. Morgan, 52, Grosvenor Gardens, London, S.W.1. Application date, March 1, 1922.

The process makes use of the absorptive power of hæmoglobin for oxygen and the liberation of the oxygen at a different temperature or pressure, or both. In this process the difficulty which usually arises due to the fermentation of

(Continued on page 293.)



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hæmoglobin is avoided by operating under particular temperature conditions. The temperature of the solution or suspension of the hæmoglobin is either at or below 0° C. or at about 57° C., which is just below the temperature at which coagulation of the hæmoglobin takes place. The air may be forced through the solution or suspension under pressure, and the absorbed oxygen subsequently recovered by reducing the pressure to 0.25 atmosphere. In an example, a 12 per cent. solution of hæmoglobin is circulated through an absorption tower at 0° C., in contact with a stream of air, and the oxygen is recovered at the same temperature by a reduction of pressure. The recovered gas is about 10 per cent. of the volume of air passed through the tower and contains about 75 per cent. of oxygen. When the operation is conducted at 57° C. the oxygen is absorbed at a pressure of 1.5 atmospheres and recovered at a pressure of 0.25 atmosphere.

192,970. COMPACT METALLIC BERYLLIUM, PROCESS FOR ELECTROLYTICALLY MANUFACTURING. H. Goldschmidt, 4, Im Gehege, Berlin, Dahlem, Germany, and A. Stock, 13, Bellevuestrasse, Berlin, W.9. Application date, April 19, 1922.

Pure beryllium is obtained in a compact condition by electrolyzing the double fluoride of beryllium and an alkaline earth metal, preferably barium, heated to the melting point of beryllium, i.e., about 1280° C. The double fluoride of sodium and beryllium, which has a low melting point, is first melted in a graphite crucible, and barium-beryllium fluoride is subsequently added in gradually increasing quantities. The electrolysis is started at a temperature of 1200°-1300° C., and the beryllium content is made up by the addition of barium-beryllium fluoride or sodium-beryllium fluoride. The temperature is maintained by the passage of the current only. Beryllium of 99-100 per cent. purity is deposited on the cathode, which consists of a hollow water-cooled rod of iron.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 172,010 (R. Moritz), relating to the construction of mechanical sulphate furnaces, see Vol. VI. p. 117; 174,085-7-8 (Gulf Refining Co.), relating to cracking hydrocarbon oils, coal tar and the like, see Vol. VI. pp. 354 and 396; 187,223 (Farbwerke vorm. Meister, Lucius and Brüning), relating to apparatus for absorbing gases or vapours by means of charcoal, see Vol. VII. p. 867; 191,029 (Etablissements Poulenc Frères & C. Oetchsln), relating to the manufacture of aliphatic arsenical compounds, see Vol. VIII. p. 215.

#### International Specifications not yet Accepted

191,741. RECOVERING AMMONIA FROM GASES. Industrial Research, Ltd., 1, Imperial Buildings, Ludgate Circus, London. (Assignees of Studien Ges. für Ausban der Industrie, 19, Kronprinzen-Ufer, Berlin. International Convention date, January 10, 1922.)

Gases containing a small proportion of ammonia, such as producer gas, are passed through a carbonaceous material such as soft lignite or peat, which contains organic acids. The ammonia is absorbed and may be liberated by means of alkali. The carbonaceous material may afterwards be treated with hydrochloric acid to regenerate it. The lignite containing the absorbed ammonia may also be used as a fertiliser. The producer gas itself may be obtained from the absorbent material—i.e., lignite or peat.

#### LATEST NOTIFICATIONS.

194,278. Treatment and purification of waste liquids. Westen, F. February 28, 1922.  
194,289. Manufacture of fertilisers from sulphur or metallic sulphides. Harnist, C. March 1, 1922.

#### Specifications Accepted, with Date of Application

170,591. Tar, Removal of—from the vapours arising from the distillation of wood. E. Barbet et Fils et Cie. October 21, 1920. Addition to 120,560.  
186,035. Phosphatic fertilisers. A. L. Kreiss. September 13, 1921.  
193,431. Colouring matters, Production of. M. O. Davies, R. F. Thomson, J. Thomas and Scottish Dyes, Ltd. September 27, 1921.  
193,450. Filter elements. Plauson's (Parent Co.), Ltd. (H. Plauson.) June 23, 1922.

193,451. Rubber, Manufacture of. P. Schidrowitz. September 24, 1921.  
193,520. Plastic masses from mica, asbestos or similar silicates, Process for the production of. Plauson's (Parent Co.), Ltd. (H. Plauson). November 29, 1921.  
193,521. Mineral oils, petroleum, benzine, and other hydrocarbons, Process for the refining of. Plauson's (Parent Co.), Ltd. (H. Plauson). November 29, 1921.  
193,524. Mixtures of rubber and artificial resins, Process for the production of. Plauson's (Parent Co.), Ltd. (H. Plauson.) November 30, 1921.  
193,546. Ores, Treatment of. E. C. R. Marks. (Merrill Co.) December 5, 1921.  
193,551. Formic aldehyde, Process for solidifying. W. Carpmæl. (Chemische Fabrik auf Actien (vorm. E. Schering.) December 6, 1921.  
193,575. Organic gases or vapours of organic products, Process for separating or isolating. Farbenfabriken vorm. F. Bayer and Co., and A. Engelhardt. December 16, 1921.  
193,618. New chloroethyl-ester, Manufacture of—and the treatment of phenols, alcohols and amino-compounds therewith. British Dyestuffs Corporation, Ltd. W. H. Perkin and G. R. Clemo. January 19, 1922.  
193,632. Centrifugal apparatus for breaking up liquids and disseminating them in solids, or for mixing and drying liquids and solids. F. H. Loring. January 27, 1922.  
193,646. Cellulose acetate, Dyeing of. Burgess, Ledward and Co., Ltd., and W. Harrison. February 4, 1922.  
193,663. Hydrazobenzol and homologues, Method for deriving. F. B. Dehn. (H. J. Lucke.) February 15, 1922.  
193,722. Hydrocarbons of high boiling point or tar oils, Manufacture of water soluble-products from. W. Moeller. March 25, 1922.  
193,789. Catalytic synthesis of ammonia, Apparatus for. L. Casale and R. Leprestre. August 24, 1922.

#### Applications for Patents

Appareils et Evaporateurs Kestner. Evaporating apparatus for concentrating acid liquids. 6445. March 6 (Belgium, March 24, 1922.)  
Baddiley, J., British Dyestuffs Corporation, and Shepherdson, A. Dyeing acetyl cellulose. 6738. March 8.  
— Dyeing acetate silk. 6739. March 8.  
Boer, J. R., and District Chemical Co., Ltd. Preparation of salts of boric acid. 6861. March 9.  
British Cellulose & Chemical Manufacturing Co., Ltd. Fabrics, and production of same. 6312. March 5.  
British Dyestuffs Corporation, Ltd., Green, A. G., and Oxley, H. F. Manufacture of formaldehyde or its polymers. 6737. March 8.  
Chambers, E. V. Distillation of tar. 6822. March 9.  
Coley, H. E., and Hornsey, J. W. Production of iron from ores. 6306. 6308. March 5.  
Consortium für Elektrochemische Industrie Ges. Manufacture of anhydrides of fatty acids. 7009. March 10. (Germany, March 10, 1922.)  
District Chemical Co., Ltd. Electrodes for arc welding and metal cutting. 6860. March 9.  
Dreyfus, H. Manufacture of products from cellulose derivatives. 6569. 6570. March 7.  
Henkel et Cie., and Weber, W. Process for treating iron chloride lyes. 6595. March 7. (Germany, April 4, 1922.)  
— Process for treating ammonium chloride lyes in iron vessels. 6596. March 7. (Germany, April 22, 1922.)  
— Process for treating ammonium chloride lyes in iron vessels. 6597. March 7. (Germany, November 15, 1922.)  
Henshilwood, A. B. Dye-vats, tanks, etc. 6293. March 5.  
Lloyd, T. H. Manufacture of glue and gelatines. 6963. March 10.  
Mathieson Alkali Works, Inc. Manufacture of hypochlorites. 6458. March 6. (United States, March 25, 1922.)  
Petit, T. P. L. Process for removing hydrogen sulphide from gases. 6768. March 8. (Holland, March 16, 1922.)  
Roucka, E. Apparatus for measuring physical or chemical values at a distance or for periodically changing positions of movable parts at a distance. 6982. March 10. (Czecho-Slovakia, March 10, 1922.)  
Schotz, S. P. Treatment of butadene, its homologues, etc. 6624. March 7.  
Techno-Chemical Laboratories, Ltd. Separating solids from liquids. 6598. 6599. March 7.

#### A New Chemical Paint

COPPER naphthenate, according to the *Chemiker Zeitung*, forms an excellent base for paint used to protect the hulls of ships, since it is only very slightly soluble in water and is very poisonous, thus preventing the growth of animal and vegetable life on the underside of the vessel, with the constant fouling, and loss of speed and efficiency.

## Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, March 15, 1923.

THE market has been quite bright during the past week, with a quite satisfactory turnover. The significance of the Continental situation is gradually being realised, and buyers show anxiety to cover their requirements. Prices tend upwards, and a bullish tone is evident.

There has been a big export inquiry. A considerable volume of business has been done, but a greater volume has been declined. Export markets are endeavouring to cover here lines which Germany can no longer deliver.

### General Chemicals

ACETONE is a rising market. A substantial business has been done, and supplies are scarce.  
ACETIC ACID is much firmer in price. The demand is active, and stocks are practically non-existent.  
ACID CITRIC.—The better tone is maintained, but otherwise the past week has been without special feature.  
ACID FORMIC is becoming scarce, and the price for foreign makes is nominal.  
ACID LACTIC is unchanged.  
ACID OXALIC.—A fair business is reported and the price is firm.  
ACID TARTARIC.—Deliveries from Germany are held up. The other foreign makers have advanced their prices sharply.  
ARSENIC is unchanged.  
BARIUM CHLORIDE is offered at rather lower figures. The demand is slack.  
COPPER SULPHATE.—The usual season's inquiry is commencing, but no great volume of business is in sight.  
FORMALDEHYDE is a quietly steady market, and any increase in demand would send the price up rapidly.  
LEAD ACETATE.—A good business is passing and the price is higher.  
METHYL ALCOHOL is still scarce and firm.  
POTASSIUM CARBONATE AND POTASSIUM CAUSTIC.—The firm tendency is maintained, but seems to be due to anticipation of difficulties in Continental deliveries.  
POTASSIUM PERMANGANATE is a very firm market, with little in sight.  
POTASSIUM PRUSSATE is firm and is in fair demand.  
SODIUM ACETATE is very scarce; works are sold some way forward.  
SODIUM BICHROMATE is unchanged.  
SODIUM HYPOSULPHITE is in good demand at recent figures.  
SODIUM NITRITE.—There has been rather more inquiry and the price is firm.  
SODIUM PRUSSATE is very much firmer. Supplies for early delivery are scarcer and export markets are nibbling.  
SODIUM SULPHIDE.—The market is stagnant, and the price is inclined to droop.  
ZINC OXIDE.—The good qualities are very scarce indeed and in strong demand.

### Pharmaceutical Chemicals

ACETYL SALICYLIC ACID is very firm, with a tendency towards higher prices.  
ACETANILID has advanced, fresh supplies from the Continent being difficult to obtain.  
ACID SALICYLIC cannot apparently be manufactured profitably by the English makers below the price named in our list, while Carbolic Acid remains at its present level, and the recent advance should therefore be maintained.  
BARBITONE.—The demand has been small and stocks are low.  
BROMIDES are steadier, consequent upon the Continental situation. Holders are not inclined to sell freely at last prices.

MERCURIALS.—English makers have reduced their prices by 2d. per lb. in sympathy with the fall in mercury. Supplies of the principal salts are available from second hands slightly below the new scale.

PARALDEHYDE is advancing.

PHENACETIN is higher again and may advance still further.

SODA SALICYLATE.—The upward movement continues, the best makers selling freely at the higher figures now quoted.

THEOBROMINE SODA SALICYLATE is slightly easier on the week. The demand continues poor.

### Coal Tar Intermediates

Business has been rather better during the past week, with a fair amount of export inquiry in the market.

ALPHA NAPHTHOL.—Some small inquiries have been received.  
ALPHA NAPHTHYLAMINE has been a moderate home business, with good export inquiries about.

ANILINE OIL.—Some fair home trade business has been booked, and this product is quite firm.

BENZALDEHYDE.—Export and home inquiries have been received, the former on a fair scale.

BENZIDINE BASE.—Home orders have been booked, and export inquiry has been received.

DIMETHYLANILINE is very firm.

DIPHENYLAMINE.—A good export inquiry.

"F" ACID.—Export buyers are interested.

GAMMA ACID.—Some small inquiry.

NAPHTHIONIC ACID is a fair home trade business.

PARANITRANILINE.—Orders have been booked for both home and export.

RESORCIN.—Some small home trade is reported.

### Coal Tar Products

Coal tar products generally are in good demand, and in many cases prices are reaching a very high level.

90% BENZOL is steady at about 1s. 6d. per gallon on rails.

PURE BENZOL is fairly plentiful, and is worth about 1s. 10d. to 1s. 11d. per gallon in the North and about 2s. 1d. to 2s. 2d. in the South.

CREOSOTE OIL is in good demand, and is worth about 9d. per gallon on rails in the Midlands and Forth and about 9½d. to 9¾d. per gallon in the South.

CRESYLIC ACID is interesting at about 2s. per gallon for the Pale quality, 97/99%, while the Dark, 95/97%, is worth about 1s. 10d. per gallon on rails.

SOLVENT NAPHTHA is uninteresting, and has a poor demand. It can be bought at about 1s. 5d. per gallon in the North, while the price in London is about 1s. 9d. to 1s. 10d. per gallon.

HEAVY NAPHTHA is unchanged at 1s. 6d. per gallon.

NAPHTHALENES are in steady demand, the crude qualities with lower melting points being worth £8 to £9 per ton, while the hot pressed quality is worth about £12. per ton.

PITCH remains firm.

### Sulphate of Ammonia

The conditions of the market are unchanged.

### Current Prices

#### General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride.....	lb.	0	1	6	to	0	1	8
Acetone oil .....	ton	90	0	0	to	95	0	0
Acetone, pure .....	ton	130	0	0	to	135	0	0
Acid, Acetic, glacial, 99-100% .....	ton	69	0	0	to	70	0	0
Acetic, 80% pure .....	ton	48	0	0	to	49	0	0
Acetic, 40% pure .....	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g. ....	ton	100	0	0	to	105	0	0
Boric, cryst. ....	ton	55	0	0	to	60	0	0
Carbolic, cryst. 39-40% .....	lb.	0	1	7	to	0	1	8
Citric .....	lb.	0	1	9	to	0	1	10
Formic, 80% .....	ton	52	10	0	to	53	0	0
Hydrofluoric .....	lb.	0	0	7½	to	0	0	8½



**Coal Tar Intermediates, &c.**

	Per	£	s.	d.	£	s.	d.
Benzidine, sulphate.....lb.	0	3	9	to	0	4	0
Benzoic acid.....lb.	0	2	0	to	0	2	3
Benzyl chloride, technical.....lb.	0	2	0	to	0	2	3
Betanaphthol.....lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical.....lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis.....lb.	0	3	3	to	0	3	6
Dichlorbenzol.....lb.	0	0	9	to	0	0	10
Diethylaniline.....lb.	0	4	6	to	0	4	9
Dinitrobenzol.....lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol.....lb.	0	0	11	to	0	1	0
Dinitronaphthalene.....lb.	0	1	4	to	0	1	5
Dinitrotoluol.....lb.	0	1	4	to	0	1	5
Dinitrophenol.....lb.	0	1	7	to	0	1	9
Dimethylaniline.....lb.	0	3	0	to	0	3	3
Diphenylamine.....lb.	0	3	9	to	0	4	0
H-Acid.....lb.	0	5	0	to	0	5	3
Metaphenylenediamine.....lb.	0	4	0	to	0	4	3
Monochlorbenzol.....lb.	0	0	10	to	0	1	0
Metanilic Acid.....lb.	0	5	9	to	0	6	0
Metatoluylenediamine.....lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7).....lb.	0	5	6	to	0	6	0
Naphthionic acid, crude.....lb.	0	2	3	to	0	2	6
Naphthionate of Soda.....lb.	0	2	6	to	0	2	9
Naphthylamin-di-sulphonic-acid.....lb.	0	4	0	to	0	4	3
Neville Winther Acid.....lb.	0	7	3	to	0	7	9
Nitrobenzol.....lb.	0	0	8	to	0	0	8
Nitronaphthalene.....lb.	0	1	0	to	0	1	1
Nitrotoluol.....lb.	0	0	8	to	0	0	9
Orthoamidophenol, base.....lb.	0	12	0	to	0	12	6
Orthodichlorbenzol.....lb.	0	1	0	to	0	1	1
Orthotoluidine.....lb.	0	0	10	to	0	0	11
Orthonitrotoluol.....lb.	0	0	3	to	0	0	4
Para-amidophenol, base.....lb.	0	8	6	to	0	9	0
Para-amidophenol, hydrochlor.....lb.	0	7	6	to	0	8	0
Paradichlorbenzol.....lb.	0	0	6	to	0	0	7
Paranitraniline.....lb.	0	2	7	to	0	2	9
Paranitrophenol.....lb.	0	2	3	to	0	2	6
Paranitrotoluol.....lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled.....lb.	0	12	0	to	0	12	6
Paratoluidine.....lb.	0	5	9	to	0	6	3
Phthalic anhydride.....lb.	0	2	6	to	0	2	9
Resorcin, technical.....lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude.....lb.	0	0	10	to	0	0	11
Tolidine, base.....lb.	0	7	3	to	0	7	9
Tolidine, mixture.....lb.	0	2	6	to	0	2	9

## Essential Oils and Synthetics

ESSENTIAL OILS.				£	s.	d.
Anise.....	c.i.f. 1/10 spot	0	2	0	0	2
Bay.....		0	11	0	0	0
Bergamot.....		0	12	0	0	0
Cajuput.....		0	3	9	0	0
Camphor, white.....	per cwt.	4	0	0	0	0
Camphor, brown.....		3	15	0	0	0
Cassia.....	c.i.f. 7/6 spot harder	0	8	3	0	0
Cedarwood.....		0	1	6	0	0
Citronella (Ceylon).....		0	3	0	0	0
Citronella (Java).....	very firm	0	3	9	0	0
Clove.....		0	7	6	0	0
Eucalyptus.....		0	1	6	0	0
Geranium Bourbon.....	very firm	1	7	0	0	0
Lavender.....		0	11	0	0	0
Lavender spike.....		0	3	0	0	0
Lemon.....		0	2	11	0	0
Lemongrass.....	harder, per oz.	0	0	2 1/2	0	0
Lime (distilled).....		0	3	0	0	0
Orange sweet (Sicilian).....	firm	0	9	6	0	0
Orange sweet (West Indian).....		0	9	0	0	0
Palmarosa.....		0	17	6	0	0
Peppermint (American).....		0	13	0	0	0
Mint (dementolised Japanese).....	weak	0	6	6	0	0
Patchouli.....	harder	1	12	0	0	0
Otto of Rose.....	per oz.	1	4	0	0	0
Rosemary.....		0	1	8	0	0
Sandalwood.....		1	6	0	0	0
Sassafras.....		0	5	0	0	0
Thyme.....	according to quality 2/4 to	0	6	0	0	0
SYNTHETICS.				£	s.	d.
Benzyl acetate.....		0	3	0	0	0
Benzyl benzoate.....		0	3	0	0	0
Citral.....		0	10	6	0	0
Coumarine.....		0	12	6	0	0
Heliotropine.....		0	6	0	0	0
Ionone.....		1	7	0	0	0
Linalyl acetate.....		1	2	6	0	0
Methyl salicylate.....	very firm	0	2	3	0	0
Musk xylol.....		0	9	0	0	0
Terpeniol.....		0	3	0	0	0

## The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT]

Manchester, March 15, 1923.

THE brighter tone reported last week has persisted on the chemical market here. Business, of course, is still far from brisk, and parcels are usually of comparatively small dimensions, but a better feeling has certainly been in evidence. Trade on Continental account remains inactive, the Dominions are taking fair quantities of the bread-and-butter lines. With one or two minor exceptions prices have been fairly steady during the past few days.

### Heavy Chemicals

The home and foreign demand for caustic soda has been well maintained at the level of recent weeks, and prices are firm, ranging from £19 per ton for 60 per cent. strength to £21 10s. for 76-77 per cent. Bleaching powder is still active on home account at £11 10s. per ton, though foreign business has fallen off somewhat. Soda crystals are attracting a little more attention; the prices remain unchanged at £5 5s. per ton delivered. Salt cake is in quietly steady demand for home consumption at £4 10s. per ton, and for export business is still on a good scale. Sodium sulphide, 60 to 65 per cent. concentrated, is rather quiet at £15 per ton, crystals being on offer at about £9 10s. Glauber salts are steady, and in moderate demand at £4 10s. per ton. A fair inquiry for bicarbonate of soda is being met with, and quotations are unchanged at £10 10s. per ton delivered to home consumers. Alkali is still in good demand for home consumption and for export, prices being firm at £7 12s. 6d. per ton for 58 per cent. material. Hyposulphite of soda is rather dull at about £16 per ton for photographic crystals and £10 10s. for commercial. Nitrite of soda is quiet but steady at £26 to £27 per ton. Phosphate of soda is again slightly easier at £15 per ton, business being restricted. Chlorate of soda meets with a moderate demand at 3d. per lb. Prussiate of soda is steady at 9½d. per lb., prompt parcels being rather scarce. The price of bichromate of soda has been maintained at 4½d. per lb., a fair amount of business passing. Acetate of soda has improved a little both in position and value, the current quotation being £24 per ton.

Caustic potash is very much firmer at £32 to £33 per ton for 88-90 per cent. Carbonate of potash is also higher at about £26 per ton for 90 per cent. material. Bichromate of potash is quoted at 5½d. per lb., and has a moderately active inquiry. Yellow prussiate of potash is quiet and slightly lower again at 1s. 5d. per lb. Chlorate of potash is also quiet at 3½d. per lb. Permanganate of potash is in rather good demand, and firmer at 8½d. to 9d. per lb.

Sulphate of copper remains a quiet section, considering the time of the year; the prices are unchanged at £26 to £26 10s. per ton. There is no change in the position of arsenic, which keeps firm at £75 per ton for white powdered. Cornish makes, the demand for export being very brisk the supplies are still scarce. Commercial Epsom salts are steady and in fair demand at £6 10s. per ton for British makes, foreign qualities being offered at lower rates; magnesium sulphate, B.P., is steady at £7 to £7 10s. Grey acetate of lime is very firm at about £19 10s. per ton, and brown at £10 10s., with supplies on the short side. Nitrate of lead keeps steady at £42 10s. per ton. White sugar of lead is steady and in rather good demand at £39 per ton, about the same figure being asked for brown.

### Acids and Tar Products

Tartaric acid is steady and in improved inquiry at 1s. 2d. to 1s. 2½d. per lb. Citric acid, B.P. crystals, is firmer again at 1s. 8d. per lb. and in better demand. Business in acetic acid is also expanding at £66 to £67 for glacial and £44 per ton for 80 per cent. technical. Oxalic acid keeps quiet at 6½d. per lb.

Pitch is now quoted at up to £9 per ton, f.o.b. Manchester, on a continued steady demand for shipment. Carboic acid crystals are firm and in good export inquiry at 1s. 7d. per lb.; 60 per cent. crude is unchanged at about 4s. per gallon. Benzole is quiet but steady at 1s. 8d. per gallon. Solvent naphtha is a shade firmer at 1s. 9d. to 1s. 10d. per gallon. Creosote oil is steady and in good inquiry at 8½d. to 9d. per gallon. The improvement in naphthalenes has been maintained; refined is still quoted at about £17 per ton and crude at up to £10.



## Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, March 14, 1923.

DURING the past week business has been quiet, although export inquiries have been slightly more numerous.

The prices of Continental materials are steadily rising, with the possibility of supplies being unobtainable in the near future.

### Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £59 to £65 per ton; 80% pure, £44 to £46 per ton; 80% technical, £43 to £45 per ton, c.i.f. U.K. ports shipment from Canada. Continental material very scarce.

ACID BORACIC.—Crystal or granulated, at £55 per ton; powdered, £57 per ton, carriage paid U.K. stations.

ACID CARBOLIC.—Crystals, now quoted at 1s. 7d. to 1s. 8d. per lb., delivered.

ACID FORMIC, 80%.—Still obtainable, at about £56 to £57 per ton.

ACID HYDROCHLORIC.—Unchanged, at 6s. 6d. per carboy, ex works.

ACID NITRIC, 84%.—£27 10s., ex station, full truck loads.

ACID OXALIC.—Spot lots offered at 7d. per lb., ex store.

ACID SULPHURIC.—144°, £3 5s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, £1 per ton, extra.

ACID TARTARIC.—Quoted, 1s. 2d. per lb., ex store.

ALUM, LUMP POTASH.—Price about £13 5s. per ton, ex store. Moderate inquiry.

AMMONIA, ANHYDROUS.—Unchanged at 1s. 6d. per lb., ex station.

AMMONIA, CARBONATE.—Lump, 4d. per lb.; ground, 4½d. per lb., delivered.

AMMONIA, MURIATE.—Grey galvanisers quality, about £32 15s. per ton, f.o.r. works.

AMMONIA SULPHATE.—25¼%, £15 10s. per ton; 25¾% neutral, £16 13s. per ton; ex works, March—May delivery.

ARSENIC.—Price maintained at about £76 to £77 per ton, ex quay.

BARIUM CHLORIDE.—Advanced to about £18 per ton, for spot lots.

BARYTES.—English white powdered, £5 5s. per ton, ex works.

BLEACHING POWDER.—Spot lots £11 10s. per ton, ex station. Contracts 20s. per ton less.

BORAX.—Crystal or granulated, £28 per ton; powder, £29 per ton; carriage paid U.K. stations.

CALCIUM CHLORIDE.—English material £5 15s. per ton, ex quay or station. Continental now offered at £4 10s. per ton, c.i.f. U.K.

COPPERAS, GREEN.—Available at £2 10s. to £2 15s. per ton, f.o.b. U.K.

DEXTRINE.—Finest Dutch £20 10s. per ton., c.i.f. U.K. ports.

FORMALDEHYDE 40%.—Spot lots now quoted £92 per ton.

GLAUBER SALTS.—Fine white crystals, £4 per ton, ex store.

LEAD, RED.—English material, £43 per ton, carriage paid U.K. 5-ton lots. Continental red lead about £35 10s. per ton, ex store.

LEAD, ACETATE.—White crystals now quoted, £39 10s., ex store, spot delivery.

MAGNESITE, GROUND CALCINED.—£8 10s. per ton, ex station.

MAGNESIUM CHLORIDE.—Continental prices advanced by about 7s. 6d. per ton. Now £3 5s. per ton, c.i.f. U.K. Spot lots about £4 15s. per ton, ex store.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial crystals, £7 per ton. B.P. about £8 10s. per ton delivered, B.P. for export, £6 10s. per ton, 2 cwt. bags, f.o.b. U.K.

POTASSIUM BICHROMATE.—English makers' price unchanged, 5½d. per lb., delivered.

POTASSIUM CARBONATE, 90/92%.—Spot lots offered at £28 per ton, ex store.

POTASSIUM, CAUSTIC, 88/92%.—Continental prices advanced to about £32 per ton, c.i.f. U.K. Spot lots quoted £33 per ton.

POTASSIUM CHLORATE.—Now quoted 3½d. per lb., ex store.

POTASSIUM PERMANGANATE.—B.P. quality offered at 9d. per lb., ex store.

POTASSIUM PRUSSIATE (YELLOW).—Offered at 1s. 5d. per lb. c.i.f. U.K. ports.

POTASSIUM SULPHATE.—Quoted £7 5s. per ton, basis 80% f.o.r. works.

SODIUM ACETATE.—Still offered at about £24 per ton, ex store, spot delivery.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex station; mineral water quality, £1 10s. per ton less.

SODIUM BICHROMATE.—English make unchanged at 4½d. per lb. delivered.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station.

SODIUM CARBONATE (ALKALI, 58%).—£8 17s. 6d. per ton, ex quay or station.

SODIUM, CAUSTIC.—76/77%, £21 10s. per ton; 70/72%, £20 per ton; 60/62%, broken, £21 5s. per ton; 98/99%, powdered, £24 17s. 6d. per ton; ex station, spot delivery.

SODIUM CHLORATE.—Quoted 2½d. per lb.; c.i.f. U.K. prompt. Spot lots about 3d. per lb.

SODIUM HYPOSULPHITE.—Commercial quality, £10 per ton, ex store; pea crystals, £15 10s. per ton, ex station.

SODIUM NITRATE, 96/98%.—Refined quality about £13 10s. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Spot lots quoted 9½d. per lb., ex store; Continental offers of 8½d. per lb., c.i.f. U.K.

SODIUM SULPHATE (SALTCAKE, 95%).—Price to home consumers, £4 per ton, on contract. Higher prices for export.

SODIUM SULPHIDE.—60/62% conc., advanced to £15 10s. per ton, c.i.f. U.K. ports; spot lots about £17 per ton;

30/32% crystals offered at £9 per ton, c.i.f. U.K.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £8 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 2d. per lb.

ZINC CHLORIDE.—98% solid English material, £25 per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Quoted £14 10s. per ton, ex station.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Is in good demand. Price, 1s. 6½d. to 1s. 7½d. per lb., delivered.

AMIDO SALICYLIC ACID.—Home inquiry. Price, 7s. 6d. per lb., delivered.

ANILINE OIL.—Export inquiry. Price, 1s. 0½d. per lb., f.o.b., drums included.

BETA OXY NAPHTHOIC ACID.—Supplies are offered at 10s. per lb., delivered.

BETA NAPHTHYLAMINE.—Restricted home demand. Price, 4s. 3d. per lb., delivered.

BETA NAPHTHOL.—Good home inquiries. Price, 1s. 1d. per lb., delivered.

CLEVES ACID.—Small inquiry. Price quoted 4s. per lb., 100% basis, delivered.

DINITROBENZOL.—Inquiries for both home and export. Price quoted 1s. 3½d. per lb.

DINITROTOLUOL.—Inquiries both for home and export. Price quoted 1s. 5½d. per lb. to 1s. 6d. per lb.

DINITROCHLOROBENZOL.—In fairly good demand. Price, £95 per ton.

ETHYL BENZYL ANILINE.—Export inquiry. Price, 8s. per lb., f.o.b.

"F" ACID.—Home inquiry. Price quoted 10s. per lb. on 100% basis, delivered.

"J" ACID.—Small home inquiry. Price, 15s. per lb., 100% basis, delivered.

NAPHTHALENE FLAKE.—Is offered at £16 per ton, delivered.

META TOLULINE DIAMINE.—Some inquiries for export. Price, 5s. per lb., f.o.b.

ORTHO AMIDO PHENOL BASE.—Home inquiry. Price quoted 11s. 6d. per lb., delivered.

NITRO BENZOLE (WASHED).—Home inquiry. Price quoted 8d. per lb., delivered, returnable drums.

PARA NITRO TOLUOL.—Export inquiry. Price quoted 3s. 6d. per lb., f.o.b.  
 PARA AMIDO PHENOL BASE.—Home inquiry. Price quoted 7s. 9d. per lb. on 100% basis, delivered.  
 PARA XYLIDENE.—Small inquiry. Price, 8s. 4d. per lb., delivered.  
 PARANITRANILINE.—Fair demand. Home price 2s. 7d. to 2s. 8d. per lb., delivered.  
 SODIUM NAPHTHIONATE.—Export inquiry. Price, 2s. 8½d. per lb., f.o.b.

## Company News

C. AND W. WALKER.—A dividend of 20 per cent. is announced.

SHAWINIGAN WATER AND POWER.—A dividend of 1½ per cent. for the quarter to March 31 will be paid on April 10.

HARRISONS AND CROSFIELD.—A dividend is announced on the cumulative preference shares at the rate of 6 per cent. per annum for the three months ending March 31, less tax.

PARKE'S DRUG STORES.—The company announce the payment on March 20 of preference dividend for the half-year ended February 28 at the rate of 6 per cent. per annum, less tax.

ABERTHAU AND BRISTOL CHANNEL PORTLAND CEMENT.—The profit for 1922 was £68,517, which, with a balance brought in, makes £101,844 now available. The directors have reserved £10,000 for taxation and contingencies, and recommend a final dividend of 8 per cent. on the ordinary shares, making 15 per cent. for the year, placing £10,000 to reserve, and carrying forward £32,273.

LIMMER AND TRINIDAD LAKE ASPHALT CO.—The accounts for 1922 show a credit balance of £79,501. The directors recommend a final dividend of 7½ per cent. less tax, and a cash bonus of 1s. 6d. per share, less tax, on both the preference and ordinary shares, to general reserve £15,000, leaving to be carried forward £24,076, subject to final adjustment of E.P.D. and corporation profits tax.

JOSEPH NATHAN AND CO. (GLAXO), LTD.—The directors have decided to postpone consideration of the payment of the interim dividend on the preferred ordinary and ordinary shares until a later date, when they can more definitely ascertain the results of the company's trading for the current year. The balance-sheet and report for the year ended September 30, 1922, will be published during April.

BRITISH ALUMINIUM CO.—The profit for 1922, including the amount brought forward, after making provision for taxation and after charging the amounts required for the service of the prior lien debentures, was £83,804. The sum of £30,000 has been set aside to depreciation reserve, raising the fund to £600,000, and £10,000 has been added to the reserve fund, together with £30,000 reserve against investments not now required, increasing the fund to £220,000. The directors recommend a final dividend of 5 per cent. per annum on the ordinary share capital, making 5 per cent. for the year, leaving £15,778 to be carried forward.

ELECTRO-BLEACH AND BY-PRODUCTS, LTD.—The profit for 1922, after deducting repairs, standing charges, depreciation, income tax, etc., amounts to £51,281, to which must be added £79 brought forward from 1921, making a total of £51,360. After charging the interim dividend on preference shares, there is an available balance of £44,360. The directors recommend final dividends of 5½ per cent. on the preference shares (making 9 per cent. for the year), and of 18 per cent. on the ordinary shares; that £14,115 be transferred to the reserve account, and that £1,244 be carried forward. The annual meeting will be held at the Midland Hotel, Manchester, on March 21.

SOUTHALL BROTHERS AND BARCLAY, LTD.—The profit for 1922 was £30,806, and to this is added £12,376 brought forward, making a total of £43,182, out of which has been paid an interim dividend on preference shares, leaving a balance of £40,432. The directors recommend the payment of a year's dividend on the ordinary shares of 10 per cent., free of tax, and a bonus of 6d. per share, also free of tax, and that £6,000 be placed to reserve, leaving £20,932 to be carried forward. The board propose to distribute by way of bonus one ordinary share for every four held, transferring £21,500 from the internal reserve to the credit of profit and loss account for the purpose.

## Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. No.
Bilboa ..	Chemical products and soap..	—
Canada ..	Insecticides, disinfectant soaps surgical dressings, etc. ..	—
Ontario ..	Varnishes and paints ..	—

## Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

PHILADELPHIA.—Cresylic acid. Particulars from Department of Overseas Trade, 35, Old Queen Street, London. Reference No. 18812/F.W./C.C./ (2).

SAN FRANCISCO.—Acetone. Particulars from Department of Overseas Trade (Room 52), 35, Old Queen Street, London. Reference No. 18776/F.W./C.C./2.

## Tariff Changes

MAURITIUS.—The import duty on many articles has been increased from 12 per cent. to 20 per cent., including perfumery and toilet preparations, but not including scientific glassware.

GERMANY.—Licences for the export of tar, pitch, and tar oils have been temporarily suspended.

ITALY.—The following substances may now be imported duty free:—Mineral oil distillation residues, to be used in the calcium cyanamide industry (a decree will specify the regulations to be complied with); concentrated ammonia liquor; native and bone superphosphates for manure; nitrate of soda (crude, either natural or synthetic).

RUSSIA.—Import of the following is now temporarily suspended:—Calcined soda; caustic soda; chloride of lime; chloroform; ether; sulphate of soda; alum of all kinds; acetic acid, comestible; red lead; heavy spar; oil and spirit varnishes; glass laboratory ware, etc.

## French Potash

TRADE in potash salts during the past week was normal, with quotations for all grades steady. The bulk of trade passing at the present time being for early delivery to meet present requirements, few merchants seem to be laying in surplus stocks. From sales it would appear that a larger proportion of kainit 14 per cent. is being utilised this year. Potash is required in larger quantities on the lighter soils, and the relatively cheaper lower grades are finding a readier market. The slump in the potato trade seems to be adversely affecting sales of muriate of potash and sulphate of potash, but these are meeting a fair demand in horticultural districts. The export trade is fairly active, and the prospect of increasing sales in the Colonies is good. In America the demand is steady, and it is not anticipated that the market for Alsatian potash will be in any way affected by the recent agreement between the German Potash Syndicate and the Potash Importing Corporation of America.—*French Potash Mines Bureau.*

## Recent Wills

Mr. Henry George Rushbrook, of Brecknock Road, Tufnell Park, N., secretary of Courtaulds, Ltd. ....	£17,881
Mr. Robert Sadler, of Bridgeton, Glasgow, and of Sadler and Co. (Glasgow), Ltd., soap manufacturers .....	£6,644
Mr. James Wright Salisbury, of Limbrick Hall, Harpenden, Hertfordshire, chairman of Horace Cory and Co., Ltd., chemical colour makers..	£61,894



# THE BRITISH ALIZARINE COMPANY LTD.

**Manchester**

**London**

**Glasgow**

## Manufacturers of Alizarine Dyestuffs

ALIZARINE RED  
(all shades)

ALIZARINE BORDEAUX

ALIZARINE GREEN  
(soluble and insoluble)

ALIZARINE RED S. POWDER

ALIZARINE (MADDER) LAKES  
(of all qualities)

ALIZUROL GREEN  
(Viridine)

ALIZANTHRENE BLUE

ALIZARINE BLUES  
(soluble and insoluble)

ALIZARINE CYANINE

ALIZARINE ORANGE

ALIZARINE BLUE BLACK

ALIZARINE MAROON

ANTHRACENE BROWN

ALIZANTHRENE BROWN

ALIZANTHRENE YELLOW

Other fast colours of this series in course of preparation

Anthraquinone, Silver Salt and all intermediates of this series

CHROME TANNING and other Chrome Compounds

TELEPHONES  
663 Trafford Park, MANCHESTER  
400 EAST LONDON  
2007 DOUGLAS, GLASGOW

TELEGRAMS:  
BRITALIZ MANCHESTER  
BRITALIZ LONDON  
BRITALIZ GLASGOW

All communications should be  
addressed to

The British Alizarine Co., Ltd.  
Trafford Park, Manchester

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

FERTILISERS (MANCHESTER), LTD., 43, York Street, Manchester, manufacturing chemists. (C.C., 17/3/23.) £14 7s. 10d. January 30.

REPLATEIT POWDER CO., 65B, Long Acre, W.C., metal polish makers. (C.C., 17/3/23.) £26 4s. 10d. January 19.

TURNER DRUG AND GALENICAL CO., LTD., Roden Street, Ilford, manufacturing chemists. (C.C., 17/3/23.) £20 4s. 10d. January 31.

WESTERN PIGMENT CO., LTD., Beech Avenue, Plymouth, oil and colour manufacturers. (C.C., 17/3/23.) £41 2s. 1d. January 29.

### Receiverships

KAPPA WORKS, LTD. (R., 17/3/23.) W. Hancock, of 78, Queen Victoria Street, E.C., was appointed receiver on January 23, 1923, under powers contained in debentures dated June, May and September, 1922.

LLOYDS COMPOSITIONS CO. (1922), LTD. (R., 17/3/23.) H. Abey, of Barrington Street, South Shields, was appointed receiver on February 26, 1923, under powers contained in first debentures dated April 26, 1922.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the Liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

BIBBYS (BURNLEY), LTD., pill manufacturers. (M., 17/3/23.) Registered March 5, £200 3rd debenture, to Mrs. M. J. Barnes, 214, Burnley Road, Huncoat; general charge. \*Nil. May 3, 1922.

CHESHIRE GLUE AND CHEMICAL CO., LTD., Sandbach. (M., 17/3/23.) Registered February 27, £3,000 debentures (including £2,500 already registered) (filed under sec. 93 (3) of the Companies (Consolidation) Act 1908), present issue £500; general charge; also registered March 5, £400 debentures part of £3,000; general charge. \*£2,000. July 10, 1922.

DAWSON (A. H.), LTD., Manchester, oil merchants, etc. (M., 17/3/23.) Registered March 2, £2,900 debenture, to A. H. Dawson, 13 and 15, New Wakefield Street, Manchester; general charge.

LION ESSENCE AND CHEMICAL CO., LTD., Brighton. (M., 17/3/23.) Registered February 28, £100 debentures part of £1,000; general charge. \*£450. September 30, 1922.

TAYLORS' DRUG CO., LTD., Leeds. (M., 17/3/23.) Registered March 5, £900 mortgage, to Mrs. M. I. Speight, Highgate, Roundhay; charged on 51, Station Lane, Featherstone. \*£74,796 os. 3d. January 3, 1923.

WILSON (M. H.), AND SONS, LTD., Wisbech, chemical manure manufacturers. (M., 17/3/23.) Registered March 1, mortgage, to bank; charged on Eastfield Works, Eastfield, Wisbech; also registered March 1, £16,000 debentures; general charge. \*£12,000. December 1, 1922.

### Satisfaction

WILLOW DYE WORKS, LTD. (late WILLOW LAUNDRY DYEING AND DRY CLEANING CO., LTD.), Leicester. (M.S., 17/3/23.) Satisfaction registered March 1, £1,300 and collateral mortgage registered January 14, 1921.

### London Gazette

#### Winding-Up Petition

STUCKEY (W. G.) AND CO., LTD. (W.U.P., 17/3/23.) A petition for winding-up has been presented by Castle Huskisson, Ltd., Moon Street, Islington, London, N., manufacturing chemists, and is to be heard at the Royal Courts of Justice, Strand, London, on March 27.

#### Company Winding-Up Voluntarily

DEARBORN, LTD. (C.W.U.V., 17/3/23.) H. W. Jennings, 2 and 3, Norfolk Street, London, W.C.2, accountant, appointed liquidator. Meeting of creditors at the offices of Messrs. Abbott, Deeley, Hill and Co., chartered accountants, 2/3, Norfolk Street, Strand, London, W.C.2, on Monday, March 26, at 3 p.m.

#### Notice of Intended Dividend

HAMLEY, John H., and TURLE, Douglas, carrying on business in co-partnership as COMPAGNIE JUVENILIAN, 97, Cannon Street, London, perfume merchants. Last day for receiving proofs, March 20. Trustee, W. Boyle, Senior Official Receiver, Bankruptcy Buildings, Carey Street, London, W.C.2.

#### Notice of Dividend

VAN WAASDYK, Victor Gerard (described in the Receiving order as Nagels and Co.), carrying on business at 51, Fenchurch Street, London E.C., chemical merchant. First and final dividend of 2½d. per £. Payable any day (except Saturday), between 11 a.m. and 2 p.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

#### Partnership Dissolved

BARRATT AND WYLDE (Harry Sheldon BARRATT and Frank Roe WYLDE), paint and varnish manufacturers, Pleasant Works, Hurdsfield, Macclesfield, by mutual consent as from October 27, 1922. Debts received and paid by H. S. Barratt, who will continue business as Barratt Brothers at Lower House Mills, Bollington, near Macclesfield. F. R. Wyld will continue business as F. R. Wyld and Co., at Pleasant Works, Hurdsfield, Macclesfield.

### New Companies Registered

BOOTH'S (BOOTLE) LTD., The Temple, 24, Dale Street, Liverpool. Manufacturers and dealers in manure, fertilisers, chemicals, etc., incidental to the agricultural industry. Nominal capital, £1,000 in £1 shares.

ELLIOTT, DAVIES, LTD., 29/30, King Street, Cheapside, London, E.C. Manufacturers of and dealers in oils, edible fats and other oleaginous substances, etc. Nominal capital, £5,000 in £1 shares.

THOMAS FURNIVAL, LTD. Chemical manufacturers, metallurgists, refiners, smelters, etc. Nominal capital, £1,000 in £1 shares. A subscriber: T. Furnival, 18, Clwyd Street, Wallasey, Cheshire.

HOWARD AND RANKIN, LTD. To acquire and turn to account any process, formula, patents, etc., relating to the manufacture of chemical products. Nominal capital, £5,000 in £1 shares (3,000 cumulative preference and 2,000 ordinary). A director: H. B. R. Clarke, Lincluden, Radlett, Herts.

LACTOVÆ, LTD., 28A St. John's Avenue, Orrell Park, Liverpool. Manufacturing or consulting chemists, druggists, drysalts, etc. Nominal capital, £5,000 in £1 shares.

SCOTTISH CHEMICAL CO., LTD. Chemists, druggists, drysalts, oil and colourmen, etc. Nominal capital, £3,000 in £1 shares. A subscriber: W. Caw, Wellington Street, Greenock.

TIVOLI REFRIGERATION CO., LTD., Tivoli Street, Cheltenham. Dealers in ammonia, salt and other ingredients connected with refrigeration, etc. Nominal capital, £1,500 in £1 shares.

